



Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Southern HDs Landscape Restoration Project

Environmental Assessment

Columbine Ranger District
San Juan National Forest
La Plata and Archuleta Counties, Colorado

October 30, 2021



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Cover Photo:
Typical vegetation of the southern HDs project area.
August 2020.
Taken by Noah Daniels

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Introduction

The vegetation in the HD Mountains was maintained by frequent fires in the landscape prior to the late 1800s. The exclusion of fire from the landscape in more recent times has led to denser and more continuous trees and shrubs than would have existed under more natural conditions. This results in poor habitat diversity, less forage for grazing wildlife and livestock, and higher risk of more intense wildfires.

The USDA Forest Service is proposing to use a combination of vegetation treatments including mechanical treatment, hand treatment, managed grazing, and prescribed fire on approximately 35,000 acres of national forest system land on the Columbine Ranger District of the San Juan National Forest (SJNF). These treatments would have the following goals:

- create and maintain vegetation conditions that support desirable fire behavior and support beneficial fire,
- improve forest and ecosystem diversity and resilience to disturbance,
- reduce risk to life, property, cultural, and natural resources from wildfire,
- decrease the financial costs of wildfire suppression,
- improve wildlife habitat diversity,
- increase forage production for grazing wildlife and livestock,
- provide wood products to meet local demands.

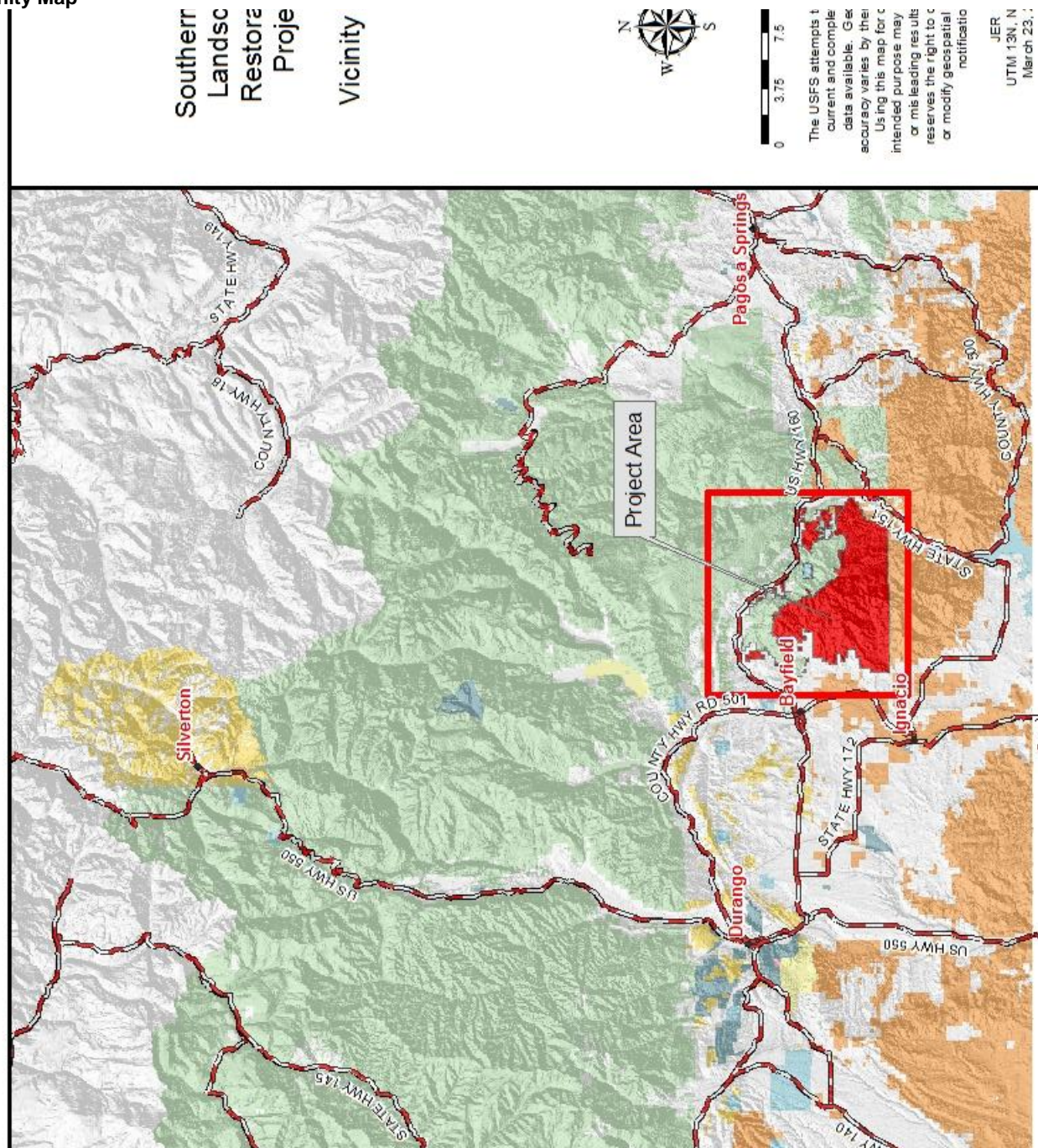
This Environmental Assessment (EA) was prepared to determine whether implementation of the proposed activities may significantly affect the quality of the human environment and thereby require the preparation of an environmental impact statement.

Proposed Project Location

The project area is located within La Plata and Archuleta Counties in Colorado. It is located on the southern, western, and eastern flanks of the HD Mountains (Figure 1). It is bordered by Highway 160 on the north, by Southern Ute Indian Land on the south, by the Piedra River on the east, and by private land on the west. Topography of the project area is diverse and is divided by numerous drainages, steep rocky cliffs, relatively flat benches, open meadows, and rocky south-facing slopes. Elevations of the project area range from about 6,400 feet to 8,700 feet. Ponderosa pine is the dominant tree species in the project area, with Gambel oak the dominant shrub in the understory. There is also piñon-juniper woodland in the lower elevations. In addition, isolated pockets of aspen, Douglas fir, and white fir are interspersed throughout the project area.

Legal location description: Townships 34-35 North, Ranges 5-6 West.

Figure 1. Vicinity Map



Need for the Proposal

This proposed project is needed because existing vegetation conditions vary from desired conditions.

Forest Health and Fire Behavior

Fire has played an important ecological role in the history of the shrub and forested ecosystems of the southwestern United States. Regular intervals of naturally occurring fire restrict the growth of shrubs, thin the forest of excess trees, and often increase plant diversity. Since the early 20th century, the frequency of natural fire has decreased dramatically. This decrease, coupled with increased settlement in forested areas, has directly related to the increase demand for wildland fire suppression to protect life and property, and has led to large areas of dense, overgrown vegetation and accumulation of fuel.

Fire behavior is most often characterized by flame length, rate of spread, and fire line intensity (*Rothermel 1983*). Surface fuels are an important factor in determining how fast a surface fire will spread (rate of spread), and how hot it will burn (flame length, fire line intensity). These surface fire factors are also important to the initiation of crown fire and present the biggest safety hazard to firefighters and the public. In general, crown fires burn hotter and result in more severe effects than surface fires. Because of this, the emphasis of fuel management is often on managing the factors that contribute to the initiation and spread of crown fires. Factors that contribute to crown fire hazard include height to canopy, canopy bulk density, stand density, and basal area (*Omi and Martinson 2002*).

Historic fire disturbance patterns (fire regimes) played a key ecological role in the sustainability of the southwestern forested landscapes prior to the past 100 years of fire suppression. The composition and structure of forest vegetation, as well as the arrangement of dead material within the forest, are major factors in influencing the frequency and intensity of wildfire activity. Historically, areas like the HD Mountains saw low intensity wildfire every 7-20 years (*Wieder & Bower 2004*). This created an open forest, with patchy Gambel oak, widely spaced ponderosa pine, and some mixed conifer on wetter, dominantly north-facing slopes. Fires tended to remain small, naturally going out when hitting recent fire scars or vegetation changes, such as meadows. Suppressing fires in this area has created an overstocked forest, with a dense continuous canopies and low canopy base height. These conditions favor larger, more intense fires that kill more large trees and can scorch the soil, making forest recovery more difficult.

Due to this long-term exclusion of fire, the vegetation is not meeting desired conditions, now having tight canopy spacing, low canopy base height, extensive ladder fuels under mature ponderosa pine trees, and continuous, thick ground fuels.

This project also responds to the hazard fuels reduction goals and objectives of the National Fire Plan (*Babbitt 2000*) and the FLAME Act (*P.L.111-88 2009*), which directed the development of the National Cohesive Wildland Fire Management Strategy and other companion documents.

Wildlife Habitat

The vegetative condition of forested stands in winter range for deer and elk is also not meeting desired conditions because the vegetation has encroached on forage areas. In some areas, piñon and juniper dominated vegetation has encroached on ponderosa pine stands. Forage-to-cover ratios, which are ideally 60 percent forage-to-40 percent cover for wildlife habitat, are currently over-represented by cover vegetation types.

The proposed project area contains Colorado Parks and Wildlife designated winter range and Forest Plan designated critical winter range for both elk and mule deer. The Forest Plan has an objective to “improve approximately 5,000 acres of winter range, through mechanical and prescribed burn treatments as defined in the *American Elk Species Assessment San Juan National Forest* (USDA 2004).

Forest Plan Compliance

Under the *San Juan National Forest Land and Resource Management Plan*, hereafter referred to as the Forest Plan (USDA 2013), the project area falls primarily within Management Area 2: HD Mountains Special Area, with a secondary amount of acreage within Management Area 7: Public and Private Lands Intermix and a minor amount within Management Area 3: Natural Landscapes with Limited Management.

It is a desired condition in Management Area 2 that, “Forest health, restoration, and fuels management are routine and recurring management activities (especially along the flanks of the HD Mountains). Forest ecosystem health is consistent with minimally disturbed natural systems. Fire-return intervals and risks of high intensity fire are consistent with the range of natural variability for the various forest communities. Stand structures and vegetative compositions are representative of more natural conditions,” and “Forest health, restoration, and fuels projects are completed in order to reduce fire risk to private lands and residences along the flanks of the HD Mountains, with an overall goal of improving forest health while, at the same time, maintaining and/or returning the area to a more natural forested condition.”

Management Area 7 discussion in the Forest Plan notes that, “the proximity of these areas to private lands makes them a priority for fuels and vegetation treatments in order to reduce wildfire hazards.”

Prescribed fire, mechanical fuels treatments, timber harvest as a tool, and commercial use of forest products are all allowed in these Management Areas, with certain restrictions in Roadless Areas. Prescribed fire is a compatible tool with the large portion of the proposed project area’s designation as a Colorado Roadless Area, since no new roads are planned. Most control lines would be narrow features that may be restored post-burn.

Summary of Need

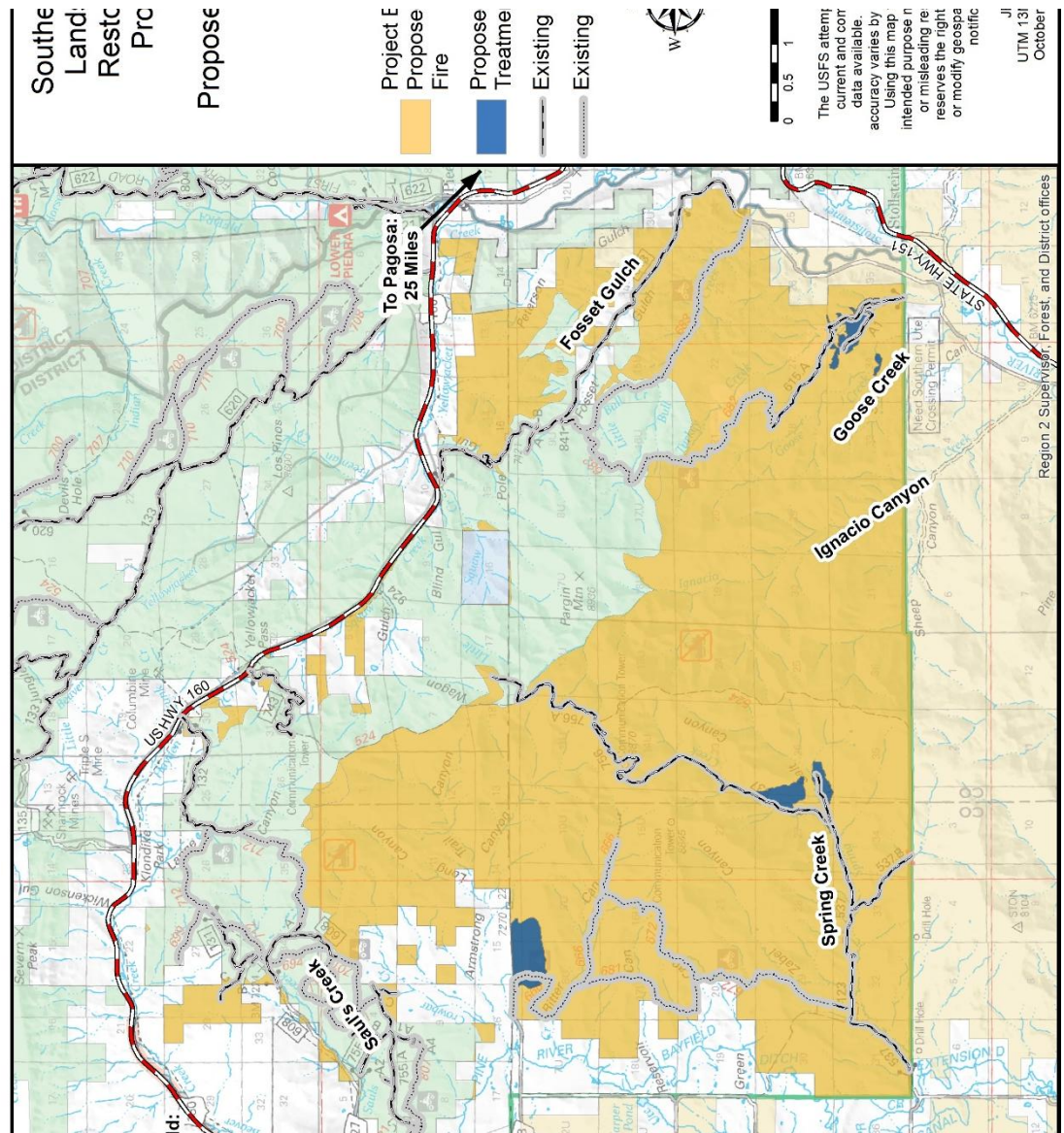
Overall, this proposal would help move the area towards meeting Forest Plan desired conditions. It would result in a heterogeneous forest structure, more open areas, less continuous fuels on the ground and in the canopy, more sunlight reaching the ground for pine seedlings and grasses, and less continuous Gambel oak patches. The residual stand

would have healthier overstory trees that are more resilient to disturbance like drought, insects, fire, and warming temperature trends. The proposed project would increase the probability of natural ponderosa pine regeneration and would release natural minerals and nutrients back into the soil. Accomplishment of treatments outlined in the proposal would lower the probability of a running stand-replacing crown fire, thus secondarily reducing the risk to life, property, cultural and natural resources, and decreasing the financial costs of fire suppression. Additional benefits would include an increase in habitat diversity for many native wildlife species, including big game, by creating more forage and increasing the amount edge and interspersed of vegetative types.

Proposed Action and Alternatives

The proposed action alternative was considered in detail. One other action alternative was considered but dismissed from detailed analysis. Additionally, some acreage originally proposed for mechanical treatment was dropped from consideration. No action is considered as part of the existing condition in the impacts analyses below.

Figure 2. Proposed Action Areas



Proposed Action

The proposed action is to employ a combination of mechanical thinning with machinery, hand thinning with chainsaws, managed grazing (in the form of goats), and prescribed fire on approximately 35,000 acres of National Forest land in order to move the project area towards desired conditions. Figure 2 displays the boundary of the area encompassed by the proposed action.

The entirety of the project is expected to be implemented in phases over several years, depending on available budgets, contractor schedules, weather conditions, and other unpredictable factors. Activities within smaller individual treatment units would generally be accomplished within one or two operating seasons. Activities could occur year-round.

The proposed action would use Forest system roads, both those open to the public and those that are closed to the public but used for administrative purposes. The proposed action could also require approximately one mile of temporary roads. Temporary roads would be used to drive equipment into treatment units and to facilitate the removal of commercial firewood and other forest products. They would be short-term in nature, would generally not require blading except in isolated spots, and would be rehabilitated after treatment as each applicable treatment unit is finished.

Prescribed fire treatments could encompass the entire proposed project area (35,000 acres) but would be focused on the ponderosa pine stands. Prescribed burning would occur in stages over multiple years. Fire treatment areas could include a variety of burning treatments including broadcast burning, aerial burning, pile burning, air curtain burning, or any combination of these. Prescribed burning also requires the clearing or maintenance of control lines, which would be installed by hand for this project; control lines could also include existing roads, trails, pipeline corridors, natural rock features, or other open areas. These handlines often consist of an area where vegetation is cut and removed of 5-15 feet in width, along with an area where surface fuel is scraped away down to mineral soil of 12-18 inches in width. Support of fire crews would include the use of motorized vehicles such as fire engines, pickup trucks, and off-highway vehicles.

Mechanical treatment units would cover approximately 550 acres. These forested lands would be thinned to control stand structure and favor desired trees, emphasizing removal of smaller diameter trees. The intent would be to restore stands to a lower overall density (50 to 70 square feet of basal area per acre) with numerous openings interspersed with variable-density clumps of trees. Thinning may be accomplished by a variety of methods which could include rubber-tired or tracked skidders, forwarders, mechanical harvesters, and stroke de-limbers, or hand thinning with chainsaws. Slash generated by thinning operations may be piled and burned, mulched, lopped and scattered, and/or removed for use in biomass utilization facilities for electricity production or other purposes. Public firewood collection and small commercial firewood sales may also occur in these areas.

Mechanical equipment such as a *Hydro-mower* or *Hydro-axe* may also be used to masticate (mulch) vegetation within the mechanical treatment units. Mastication would include treating Gambel oak and other brush species in a mosaic pattern, creating clumps and openings, removing ladder fuels, creating age class diversity, and changing the

vertical arrangement of vegetation. A mosaic of mature oak would be retained within the unit to benefit wildlife and create diversity within the vegetation. Treatment boundaries proposed for mechanical thinning were identified as result of on-the-ground field reconnaissance, vegetation type, stand configuration, and topography. Different cover types will be treated with species-specific silvicultural approaches.

Hand Thinning with chainsaws may be used across the project area for specific small-scale purposes, which could include such activities as thinning under desirable “leave” trees to prepare them for fire, or construction of fire control lines.

Managed grazing may be used to establish or maintain fire lines, to remove undesirable densities of Gambel oak and other species, or to remove ladder fuels across the project area. The goat herd would be managed by a herder and/or temporary electric fencing so that vegetation removal would be controlled in duration and intensity. This means of controlling vegetation would most likely be accomplished by goats contracted from commercial sources.

Project-Specific Design Elements

Project activities will follow requirements of existing laws, regulations, and policies, including standard best management practices, Forest Service Handbooks, and Forest Plan guidance. Appendix A includes a listing of some of the key design elements from these existing sources.

Additional design elements were developed specifically for this project in order to reduce potential negative impacts of the proposed action. These are required elements of the action:

Wildlife:

1. In mapped Critical Winter Range, Severe Winter Range, and Winter Concentration Areas: from December 1 through April 30, mechanical and prescribed fire burning operations will generally be limited to no more than two active work locations at one time. If treatment occurs during the restriction period, operating hours will be between 0900 and 1500. For prescribed fire operations only, operating hours may be extended to 1700 on up to three days during the period of December 1 to April 30.
2. In mapped General Winter Range: from December 1 through April 30, mechanical operations will generally be limited to no more than four active work locations at one time. If treatment occurs during the restriction period, operating hours will be between 0900 and 1500. Mechanical operations include chain saw work in hand thinning units, mastication, timber sale operations and biomass removal. Prescribed fire burning, pile burning, and hand-line construction are not restricted at any time.
3. At known peregrine falcon eyries, no treatments would occur within a half mile from 15 March through 1 July except as may be modified by the district ranger, in consultation with the district biologist.

Recreation:

4. Commercial big game outfitters permitted by the Forest Service will be notified in writing by June 1 of each year of possible prescribed burning in the fall of that year. The notification will include a map of the units planned for burning. Another notification will be sent at least 30 days in advance of actual operations.
5. After operations conclude in each unit, all system trails will be returned to pre-operation conditions or better, by the project proponent or operator. This could include: ripping and returning the trail tread to proper width, re-installing water drainage features, and replacing signage.
6. After operations conclude in each unit, all Travel Management control features such as tank traps, width restrictors, and signage will be returned to pre-operation conditions or better, by the project proponent or operator.
7. Cross-country and overland vehicular travel and fire control lines will be rehabilitated as necessary to discourage public use by OHVs, and will have erosion control measures installed where they occur on steep erosive soils.

Vegetation:

8. Identification materials and known locations of special status plant species will be provided to operators and crews so they may avoid unintentionally trampling or uprooting these species. This includes reported locations of Missouri milkvetch and Aztec milkvetch.
9. No mechanical thinning or mastication will be used within old growth stands or in Colorado Roadless Areas.
10. Hand thinning will be used where needed to prepare old growth stands for prescribed fire.
11. **Groups/Clumps:** In ponderosa pine dominated stands, promote more open, uneven-aged stand conditions with trees existing in clumps and groups separated by openings.

Groups consist of larger patches comprised of single trees and clumps with interlocking crowns. Groups are defined as a cluster of two or more trees with interlocking or nearly interlocking crowns at maturity, surrounded by grass-forb-shrub interspaces (*Reynolds 2013*). Size of tree groups is typically variable depending on forest type and site conditions and can range from fractions of an acre (i.e., a two-tree group), such as in ponderosa pine or dry mixed-conifer forests, to many acres, as is common in wet mixed-conifer and spruce fir forests. Trees within groups are typically non-uniformly spaced, some of which may be tightly clumped.

Clumps are generally smaller, made up of a few to several trees within a relatively short distance (0-12 feet). Clumps are defined as (1) the aggregate of stems issuing from the same root, rhizome system, or stool (*Reynolds 2013*); or (2) an isolated generally dense group of trees (*Helms 1998*).

Where existing conditions allow, retained groups should be comprised of one or more clumps ranging in size from 0.10 to 1.50 acres. Emphasis will be placed on cutting entire groups, edges of groups near meadows or openings, or isolated single trees.

Closely spaced trees within clumps that provide valuable wildlife habitat will be retained. Only thin within clumps and groups when necessary to reduce declining or highly suppressed trees, not to simply increase tree spacing within groups. Designate cut trees within clumps and groups by condition, emphasizing the removal of generally smaller diameter or poorer condition trees over removal of the dominant or co-dominant trees in the group

12. **Openings:** Create openings in ponderosa pine stands 0.25 to 1.5 acres in size adjacent to the clumps and groups described above.
13. **Gambel Oak:** Where present, attempt to reduce continuous Gambel oak and juniper ladder fuels when within or immediately adjacent to tree clumps and groups (under tree crowns or adjacent to the crown dripline). Retain large diameter Gambel oak (greater than six inches in diameter at root collar), where present, within harvested areas. Large diameter Gambel oak should only be cut where it presents an immediate hazard to the retention of desirable trees within clumps or groups. Smaller Gambel oak (less than six inches in diameter at root collar) and all juniper may be cut within openings.
14. Proposed harvest areas that fall outside of Management Area 5, are considered Tentatively Suitable, or Unsuitable for Timber Production, will be managed for an uneven-aged condition with **no scheduled re-entry** cycle. In these areas, harvests will move these areas closer towards other Forest Plan desired conditions. In areas where the current forest structure is predominantly even-aged, a harvest objective will be to promote conditions suitable for the establishment of a younger, second cohort of trees while maintaining a predominantly mature and open forest condition.
15. **Target stand structure for ponderosa pine and warm-dry mixed-conifer forests** will be informed by site-specific information on historic conditions or local forest productivity whenever possible. This may entail emulating the patterns, density, and species composition of historic trees or stumps present in the area. Lower productivity areas will feature target average basal areas from 40-60, sq. ft./acre with higher productivity basal areas averaging 60-80 sq. ft./acre. In all harvested areas, effort will be made to retain a range of stocking levels from very low 0-20 sq. ft./acre to upwards of 100-140 sq. ft./acre or more in localized areas.
16. Live **old ponderosa pine** established prior to approximately 1880 will be retained in nearly all situations in planned harvests. Exceptions may be made in localized areas to reduce declining trees affected by bark beetles and/or root rot.
17. **Follow-up Treatments:** In the 15-20 years following harvest, all ponderosa pine stands proposed for harvest will require maintenance activity consisting of prescribed fire, managed natural fire, thinning, or mastication of conifer and/or Gambel oak regrowth. These follow-up maintenance activities will not result in commercial outputs other than fuelwood or small diameter <8" non-sawtimber products.

Alternative Considered but not Analyzed in Detail

Alternatives not analyzed in detail generally include, but are not limited to, those that fail to meet the purpose and need, are technologically infeasible, or would result in unreasonable environmental harm. For this project, one alternative was considered and dismissed, and the reasons for its elimination from detailed study are discussed below.

OHV Trail Designation: This alternative includes designation of an off-highway vehicle (OHV) trail on the west side of the HDs, connecting motorized trail systems near Armstrong Canyon with motorized trail systems in Saul's Creek. The OHV trail would serve a dual purpose as a permanent fire line.

This alternative was dismissed from detailed analysis because the soils in this area are highly erosive and it would take significant trail layout and design work to find a sustainable alignment. In addition, other resource concerns would need to be evaluated through considerable additional field survey and analysis. The collection of this data is needed to guide the location of an OHV trail alignment. If this information is obtained at a later date, then an OHV trail could be considered under a separate analysis.

Adjustment of Mechanical Treatment Units: Some acres proposed for mechanical treatment during scoping were eliminated from the proposed action because they were located in the HD Mountains roadless area. Additionally, more mechanical treatment acres were dropped from the proposed action between the draft EA and the final EA because they were located within old growth stands. Mechanical treatment in both these situations is not strictly prohibited and could have been authorized. However, these acreages were dropped because they are very small part of the landscape, and the effort and oversight that would have been needed to authorize and implement within those areas would not have provided much additional benefit. Those areas are still included in the proposed action for possible hand thinning, prescribed burning, and managed goat grazing.

Environmental Impacts of the Proposed Action

This section summarizes the potential impacts of the proposed action and alternatives for each impacted resource. Resources that would not be impacted, or impacted very minimally, and therefore are not further analyzed include: minerals, term livestock grazing, prime or unique farmlands, Wild and Scenic rivers, parklands, ecologically critical areas, and Wilderness.

Each resource section begins with a description of the affected environment, which includes consequences of *not* conducting the project. Then, each section provides a description of impacts to the human environment from the proposed action that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action. The effects of past, present, and reasonably foreseeable actions are considered as part of the affected environment.

Fire Behavior

Long-term suppression of fire in fire-dependent ecosystems such as the ponderosa pine and Gambel oak vegetation types has created dense, continuous vegetation conditions that are favorable for large, high intensity wildfires. In the lower elevation, the predominant vegetation is piñon-juniper woodland with a mixed brush component on north aspects and in drainage bottoms. A few sagebrush-dominated openings are present, but they are limited in size and number. The natural fire regime for this forest type is relatively long fire return intervals (100+ years) with high intensity/high severity fires.

Mid-elevation vegetation is ponderosa pine with a brush understory. The brush is mainly Gambel oak, but also includes a mix of serviceberry, mountain mahogany, and chokecherry. A few small aspen patches are also found within the project area. The ponderosa pine-Gambel oak fuel type is known for its potential to be extremely volatile and can produce fast moving and intense crown fires. When the fuel is continuous, such as it is currently within the project area, these fires can consume hundreds if not thousands of acres in only a few hours. The natural fire regime for this forest type is relatively frequent fire return intervals (8-30) years with low to mixed severity fires. Fires in this fuel type have historically burned through the surface fuels with intermittent runs through the brush canopy and occasionally torching the trees. Surface fuel loading are currently moderate to heavy, and rapid fire spread can be induced simply by hot dry weather, creating an event whereby the fire moves from the brush to the tree canopy and produces a crown fire. A highly continuous tree canopy combined with tall, thick brush below, often results in destructive fires moving rapidly over large areas.

Higher elevations include ponderosa pine with a mosaic of mixed brush in the understory. Douglas fir and white fir can be found on the north facing slopes. Pockets of aspen (0.10 acre to 3 acres in size) are scattered throughout. The overstory consists of large dominant and co-dominant yellow-bark ponderosa pine trees that are approximately 200 - 300 years old with a dense understory of small diameter (6" – 12" DBH) trees. The shrub layer is relatively clumpy and consists of Gambel oak, serviceberry, mountain mahogany and chokecherry. The spacing of existing overstory trees and stumps suggest that the area was

historically open with a more park-like structure that consisted of large trees and openings prior to extensive grazing and fire exclusion.

The project area has had some prescribed burning, mechanical treatments, and managed natural fire in the last decade, totaling approximately 2,430 acres. This has helped move the landscape towards more natural conditions but includes only a small percentage of the total landscape. Fire effects are relatively short-lived and lose their effectiveness over time, especially in oak vegetation types.

The following evaluation criteria were used to assess the effects of the proposed action and its effectiveness in meeting project objectives:

- Reduction of crown fire potential: reduce chance of crown fire.
- Flame length: flame lengths generally less than four feet are desired allowing for safe direct attack by hand crews. Flame lengths greater than four feet generally require equipment to be employed such as dozers and aircraft; beyond eight feet torching, crowing, and spotting can occur.

In the proposed action, ladder and crown fuels would be reduced through a variety of methods including mechanical treatments, hand thinning, and prescribed fire. The reduction of surface fuels would reduce the potential flame length within the proposed treatment areas. This, when combined with raising the canopy base heights by reducing the ladder fuels, would reduce the ability of a fire to transition into a crown fire. Due to the many decades of fire suppression, many ponderosa pine-Gambel oak areas have high fuel loading, and several prescribed fire treatments may be needed to reduce the fuel loading to desired levels with low to moderate fire intensity. Certain portions of the area, such as Armstrong and Long Canyons, have a combination of fuel loading, topography, and difficult access that limits the opportunities to treat them with prescribed fire. However, treating these areas would still be possible with a more limited prescription than other areas, reducing the expected fire behavior.

Fire behavior modeling, in an adjacent area with similar fuels, estimated a reduction in flame length over eight feet from 40% to 70% of the area, and an increase in flame lengths of four feet or less from 46% to 78% of the area. These lower flame lengths reduce the potential for high intensity wildfire at the fireline, allowing for direct attack suppression tactics more often. Previous research (*Pollet and Omi 2002, Holden et al 2007, Roccaforte et al 2015*) have shown the effectiveness of prescribed fire in reducing fuel loading, raising canopy base height, and reducing the intensity and impact of wildfires.

The proposed fuels treatments in the project would provide firefighters with a strategic place to defend against oncoming fire from untreated areas. Treated areas may be burned again in the future to further reduce fuel accumulations and maintain the effectiveness as a fuel break. Fire lines would primarily be existing roads and trails, with some installed handlines. Handlines may be blocked off or rehabbed after implementation of prescribed fire to keep them from becoming trails or roads but may be reused during later prescribed fire entries. Erosion mitigation measures, such as spreading brush and installing

waterbars, may be used on some handlines that are at a high risk of erosion. Semi-permanent fire lines would allow for more efficient and cost-effective use into the future.

Each naturally occurring, unplanned ignition will undergo analysis of weather and fuels conditions, risks, and benefits particular to each fire start before a decision is made to manage it for resource benefit or suppress it. If a fire exceeds the desired behavior and resulting impacts are unacceptable, suppression tactics would be employed as needed to protect private and public resources. By implementing the proposed action, more naturally occurring fires would meet conditions to be allowed to continue to burn, thus allowing the re-introduction of more natural fire conditions on the landscape.

In general, the treated areas would have reduced flame lengths, less crown fire activity, and less severe smoke effects than untreated areas. The overall fire hazard would be reduced across the project area, including on adjacent private lands. Treatments would result in more predictable fire behavior that can be more effectively managed and pose less potential threat to Wildland Urban Interface areas.

Reintroducing fire to this area under conditions that allow for a reduction in fuels without high intensity fire behavior is the primary goal of this project. This may be done with prescribed fire, managing unplanned ignitions, and limited mechanical treatments.

Vegetation

Vegetation Cover Types

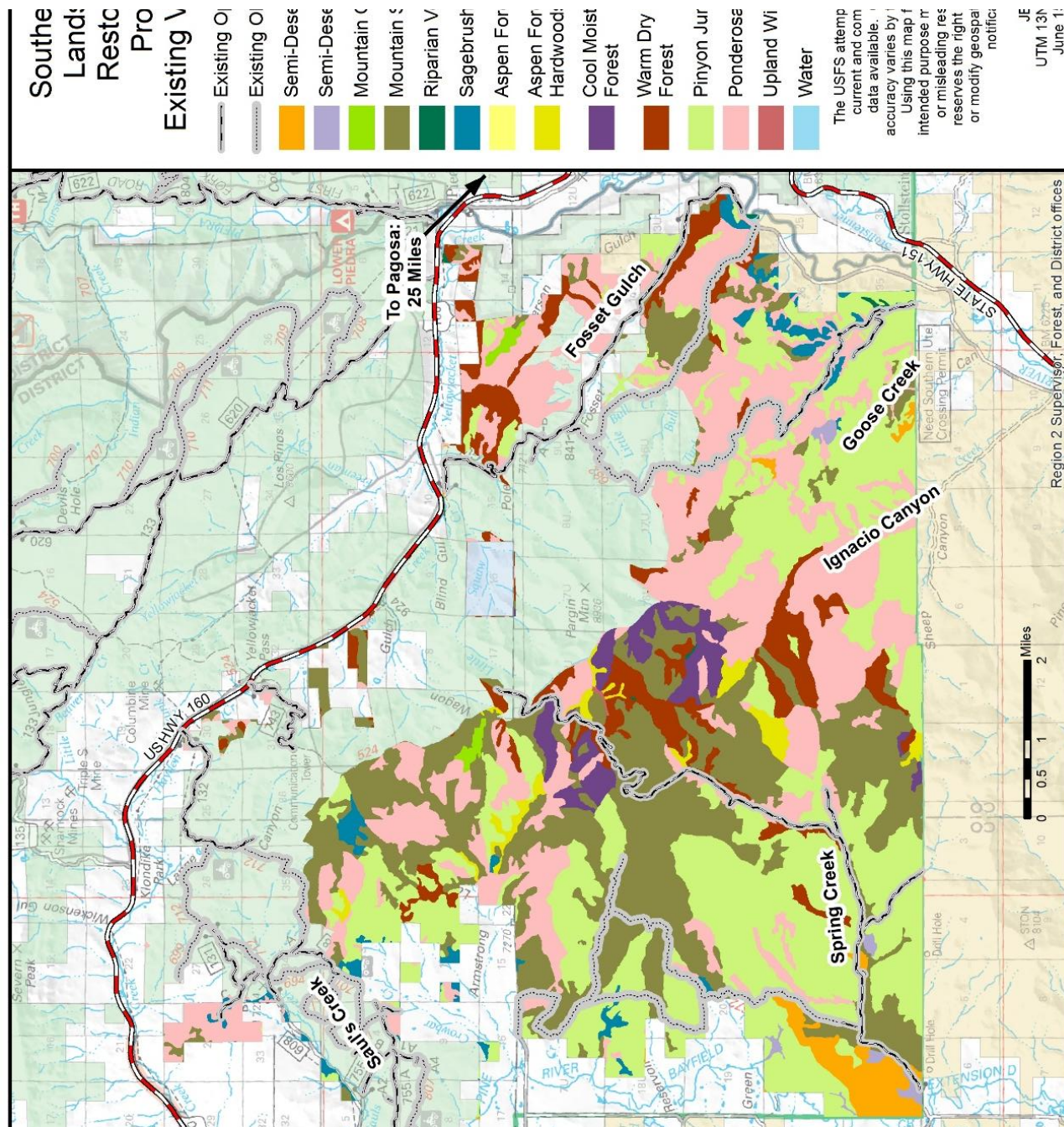
Topographic conditions across the Southern HD Mountains are variable in nature. The significant variability supports many low to mid-elevation vegetation cover types, which vary by soil profile and aspect. The HDs are known to support forests of ponderosa pine, piñon pine, Rocky Mountain juniper, Gambel oak woodlands, and grassy meadows. In addition, isolated pockets of aspen, Douglas-fir, and white fir are interspersed throughout the project area. Ponderosa pine and piñon-juniper are the dominant species in the project area, with Gambel oak as the dominant understory shrub species.

Ponderosa Pine Cover Type

Ponderosa pine forests are spread across much of the analysis area (Figure 3), generally occupying slopes in the mid-elevations. Vertical stand structure varies across the different ponderosa pine dominated environments of the Southern HD Mountains. Stands that have experienced historical harvest generally possess a two-aged stand composition. In certain portions of the analysis area, scattered large diameter, overstory, pre-settlement ponderosa pine persist, and are approximately 200-300 years old. The intermediate and co-dominant cohort of pine is primarily second growth timber that is approximately 90-120 years old.

Most of these stands do not possess a distinctive clumpy distribution. These stands are also lacking multiple age/size classes and multiple canopy layers. Stand densities range from 80 to 130 sq.ft./acre but certain northerly aspects can possess much higher densities, and south facing aspects can possess as low as 50 sq.ft./acre. Stand level competition has led to low tree vigor in areas where growing space and resources are at a minimum. The

Figure 3. Existing Vegetation



pine dominated environment within the Southern HD's generally occurs on relatively flat benches and slopes. Soil profiles and productivity vary across much of the analysis area, leading to variability in site quality and site indices.

A majority of the pine stands mentioned above have seen at minimum one to two harvests in the past century. The current closed canopy condition within this forest type has potential to promote increased bark beetle mortality as well as detrimental fire effects. Prolonged drought has exacerbated these concerns, and the encroachment of Gambel oak and other mountain shrubs have now rearranged the historical vertical and horizontal structure of these dry pine sites.

A very small subset of pine stands in the analysis area exhibit natural stand structure resembling historical conditions including large overstory pre-settlement trees distributed in a clumpy structure interspersed with smaller trees representing a variety of diameter classes. Fire exclusion within these stands has enabled the shrub layer and other small diameter trees to encroach on dominant and co-dominant trees. This has created a condition where an abundance of ladder fuels exist which decreases the crown base height and would make the stand more susceptible to a ground fire moving up to the canopy layer.

Stands that exhibit high stand densities (Stand Density Index >60%) are approaching the point of density induced mortality, especially paired with drought impacts and shrub competition. Dwarf mistletoe is common but not as dominant of a damage agent in the Southern HD's as it is on other portions of the Columbine District. Mistletoe tends to occur on intermediate ridges and is not persistent across this cover type. Rocky Mountain Juniper saplings and intermediates are common within the southern aspects of the ponderosa pine environments, they are often over-competing the ponderosa pine regeneration.

The ponderosa pine cover type is classified according to the *National Fire Plan* as Fuel Regime I – short interval, low intensity fires. Fuels are represented by the National Fire Danger Rating System Fuel Model C (Ponderosa pine 7,000-9,000') and National Fire Behavior Prediction System (NFBPS) Fuel Model 9. A majority of the cover type is within condition class 2 or 3 as a result of missed fire cycles which has contributed to stand densities being higher than desired.

Piñon-Juniper Cover Type

The piñon-juniper cover type is interspersed across much of the analysis area (Figure 3). It persists primarily in the low to mid-elevations within the greater Southern HD Mountains. Structure within these woodlands varies depending on the topography and site conditions. Soils classified as coarse-textured, or rock outcrops in areas of otherwise fine textured deep soils are preferred sites.

Most of the piñon-juniper stands are dominated by large juniper trees interspersed with a mix of young juniper and piñon trees. Some relic pre-settlement ponderosa pine trees are present within some of the stands located adjacent to rocky ridges and prominent outcroppings. A dead fuel component exists across this cover type because of drought

stress, piñon *Ips* bark beetle activity, and black stain root disease. Young cohorts of piñon-juniper seedlings/saplings are moving into the void left by these trees.

Mechanized treatments (mastication) have been applied to this cover type over the past 15-20 years, but activities were only implemented on ground lacking rock outcrops with slopes less than 35%.

The dominant shrubs within these stands include Gambel oak, serviceberry, and mountain mahogany ranging in size from three to ten feet tall. A majority of the Gambel oak exhibits top kill as a result of late sprouting which makes it susceptible to seasonal freezes in late May. Sagebrush and other associated shrubs are present throughout but are highly variable. The herbaceous understory in these stands is generally sparse and bare soil is common.

A majority of research suggests that piñon-juniper stands have a high severity, stand replacement fire regime. The fire frequency can vary however, depending on the mix of species present. Pure piñon-juniper is characterized by a longer interval of 200 plus years, while piñon-juniper stands with a large component of shrubs have a shorter interval of 35-100 years.

Mixed Conifer Cover Type

Mixed conifer stands are in very small pockets within the analysis area. Primarily found in the north-central highlands portion of the Southern HD Mountains (Figure 3). Mixed conifer stands can include a variety of conditions depending on the time and severity of the most recent burn or insect and disease outbreak. Warm-dry mixed conifer is most common within the analysis area and is comprised of ponderosa pine with lesser amounts of aspen, Gambel oak, Douglas-fir, and white fir. Cool-moist mixed conifer is not common within the Southern HD Mountains but does persist on wetter northerly aspects.

Mixed conifer is situated between ponderosa pine stands and spruce-fir forests. Site conditions within pure ponderosa pine forests are generally too hot and dry to support mixed conifer species, while spruce-fir forests located at the upper end of the mixed conifer range occupy colder sites. The distribution and structure of this cover type is strongly influenced by temperature, moisture gradients, and soil types. The warm-dry type tends to be located at lower elevations or south facing slopes and is more open than the cool-moist type.

Historically, warm-dry mixed conifer experienced low to moderate intensity fires frequently. Cool-moist mixed conifer experienced a low frequency of fires but generally of a higher intensity and severity (*Jones 1974*).

Mountain Shrub Cover Type

The mountain shrubland cover type is found throughout the project area (Figure 3). Primary shrub species within this cover type include Gambel oak, serviceberry, mountain mahogany, cliff fendlerbush, bitterbrush, and sagebrush. The mountain shrubland cover type is found most commonly on south facing slopes on deep clay soils in swales or on shale derived soils.

Mountain shrublands can be found in abundance throughout the analysis area. Shrubs in most areas are dispersed in a mosaic pattern of clumps and openings interspersed between overstory trees consisting of ponderosa pine and/or piñon-juniper. Other areas are dominated entirely by shrubs. Gambel oak is the dominant shrub within this cover type and is prone to top kill as a result of blooming at the end of May when it is still common for the San Juan's to receive late spring frosts. Current structure of this cover type coupled with a significant dead and down component has created a condition where it is susceptible to high intensity wildfires.

Vegetation in General

If the proposed action is not implemented, some areas which could benefit from treatment will not be treated. In areas where no treatment is currently planned, trends towards increasing canopy closure, tree and shrub density, fuel loadings, and decreasing grasses and other herbaceous vegetation will continue.

Large, old trees would continue to grow and decline at current or slightly increasing rates, with greater decline in areas of high tree density. Several species of ponderosa pine bark beetles are present within the analysis area and will likely continue to kill low densities of old yellow-barked ponderosa pine. There is some potential for widespread bark beetle mortality as evidenced by areas to the west on the San Juan National Forest near Dolores, CO where bark beetle populations have greatly expanded over the past several years (USDA 2019).

Similar levels of bark beetle activity and tree mortality have not been seen on the Columbine Ranger District, but remain a possibility, especially with warming climate conditions more conducive to insect activity (Nydick *et al* 2012). Local observations on the Columbine Ranger District indicate that bark beetles have remained at endemic levels, killing individual trees and patches of large older ponderosa pines over the last several years. These individual dead trees or small patches of dead trees are a desirable habitat component in the dry pine environment on the San Juan National Forest and may remain standing for decades after beetle-kill (USDA 2013).

Ponderosa pine stands would continue to be encroached upon by piñon-juniper regeneration and the competing shrub layers. This condition will lead to less tree vigor and a reduction in stand level resiliency which paired with prolonged drought could be detrimental to meeting desired future conditions in this cover type. Without active management, any forest product value in these trees will decline over the next 5-10 years or less and over the next few decades, accumulation of these trees on the forest floor could also make future management efforts difficult.

Impacts of an uncontrolled wildfire on vegetation within the analysis area would be mixed. Wildfires would result in a range of beneficial ecosystem effects, including releasing nutrients stored in vegetation, creating openings for grass and herbs, reducing small tree densities, and promoting conditions suitable for the establishment of aspen and ponderosa pine (Romme *et al* 2009).

Wildfire will contribute to the development of complex vegetation patterns across the analysis area through killing of variable sized patches and broader areas of large trees. Under favorable burn conditions, these patches would be small, but variable in size, well distributed and overall would represent a small, but important portion of the landscape (USDA 2013). However, under severe burning conditions, wildfire could result in large areas of tree mortality, as well as secondary mortality in future years as bark beetles attack fire-scorched trees (McHugh *et al* 2003). These more severely burned areas would be expected on steep slopes and in areas of continuous dense trees, particularly in the western half of the analysis area and in canyons and dense patches of trees throughout.

In a worst-case scenario, a severe fire could burn hundreds or thousands of acres in the analysis area at moderate to high severity. This would result in an expensive, hazardous, and potentially life-threatening emergency response in an area of mixed public use. The most severely burned areas could convert from a forest to a shrubland condition dominated by Gambel oak (Romme *et al* 2009, Strom and Fulé 2007). While the probability of such a severe event is likely low given existing vegetation conditions, under a warming climate and longer and more intense fire seasons, the possibility for such a scenario is increasing (Nydick *et al* 2012, Stavros *et al* 2014).

There is some evidence that such a condition could have occurred in historic times, but severe wildfires such as this were likely relatively rare and limited in extent (Baker 2019, Brown and Wu 2005, Grissino-Mayer 2004, Romme *et al* 2009). Regardless, this scenario is incompatible with current management goals, objectives, and desired conditions and a goal of the proposed action is to reduce the probability and negative outcomes of such an event.

If the proposed action is implemented, it will counter some trends towards increasing canopy closure, tree and shrub density, fuel loadings, and decreasing grasses and other herbaceous vegetation. More areas could be treated, creating more logical and effective fuels treatment units. This would reduce the risk of high intensity fire impacting private land, homes, and infrastructure. Additionally, it would allow for more efficient response to wildfires and reduce risk to firefighters and the public by creating areas with lower fuel loading.

Within pine forests, proposed harvests will reduce canopy cover and density towards historical levels. Harvests and fuels reduction treatments, as well as proposed prescribed burning, will reduce the density and continuity of regenerating pines and will be considerably more effective than prescribed burning alone, especially where smaller trees are more established and exceed four feet in height (Battaglia *et al* 2008).

In the small portions of mixed-conifer forests, the proposed action will create conditions more favorable to the establishment of ponderosa pine, aspen and Douglas-fir versus white fir. White fir will continue to regenerate, but open, sunny and warm conditions post-harvest will make establishment of these other species more likely. With heavy canopy cover reductions there is always potential for Gambel oak or other shrub species to dominate and outcompete small trees.

Within managed forest areas, the risk of bark beetle attack, population growth and tree mortality will be reduced following treatments. Reducing the density of competing younger trees around old ponderosa pine will likely result in increased resin flow and foliar toughness, inferring some resistance to beetle attack (*Covington et al 1997*).

The use of the proposed prescribed fire in dry forest types within the analysis area would typically take place following harvest but could occur preceding harvest if fire effects to mature trees are expected to be minimal and harvest/hand thinning plans are not immediate. Prescribed fire would reduce activity fuels (i.e., slash) in harvested stands, reduce ladder fuels and maintain open understories in these areas. A mix of harvest impacts, fuels reduction treatments, and prescribed fire would be more effective in maintaining low levels of Gambel oak ladder fuels than using prescribed fire alone if no action is taken. Re-sprouting from roots of treated Gambel oak will occur. Mechanical treatments and harvests are more precise, predictable, and reliable than prescribed fire, which is highly effective, but often limited operationally by favorable burn windows, resource availability, and smoke constraints. Prescribed fire remains an important tool for managing vegetation in inaccessible areas to create gaps in the tree canopy. Pre-treatment of ladder fuels, harvest in adjacent forests, and the establishment of less hazardous fuels conditions across a larger percentage of the analysis area will increase the predictability of burn effects on vegetation and reduce the chances for unforeseen or undesirable burn effects.

The impacts of an uncontrolled wildfire on vegetation would remain mixed between beneficial and detrimental effects, with a shift towards more beneficial effects overall from the proposed action, compared to taking no action. The proposed action would likely reduce fire severity on vegetation in harvested and immediately adjacent areas under all but the most severe weather conditions (*Pollet and Omi 2002*). Reduction of fire hazard and burn severity would be most pronounced in ponderosa pine forest managed with a mix of proposed and past harvests, fuels reduction and prescribed fire (*Fulé et al 2012, Strom and Fulé 2007*).

Efforts to restore forest structure characteristics, reduce fire hazards and potential burn severity are expected to be effective, but this goal will require a greater sustained effort over time using harvest and follow up prescribed fire to reduce potential burn severity in areas that have less of a management history over the past 50 years.

Old Growth

The SJNF old growth inventory was analyzed for this project as per Forest Plan direction; further details can be found in the Old Growth Report in the project record. Figure 4 shows where inventories have mapped old growth in the project area, with the majority of known old growth being in ponderosa pine vegetation type (1234 acres), a couple stands in warm-dry mixed conifer (123 acres), and one stand of piñon-juniper (17 acres).

The following discussion concentrates primarily on the ponderosa pine type because it is the old growth vegetation type most likely to be affected by the proposed action. Other vegetation types of mapped old growth are inaccessible in the roadless area, and prescribed burning would be focused on the ponderosa type.

The desired percentage of ponderosa pine to have in old growth across the SJNF is 10-15%; the forest had 4.3% in 2013 (*USDA 2013*). When compared to the forest-wide percentage, the HDs as a whole are closer to the desired condition at 6.6%, and the project area is meeting the desired condition, having 13.6%.

The identified Goose Creek/Turkey Creek old growth vegetation has experienced significant in-growth of Gambel oak and piñon/juniper saplings and intermediate sized trees. Under these current vegetative conditions, prescribed fire activities could create moderate to high intensity fire effects, and hand thinning would be required first to align these stands to conditions that fit within allowable prescribed burning conditions.

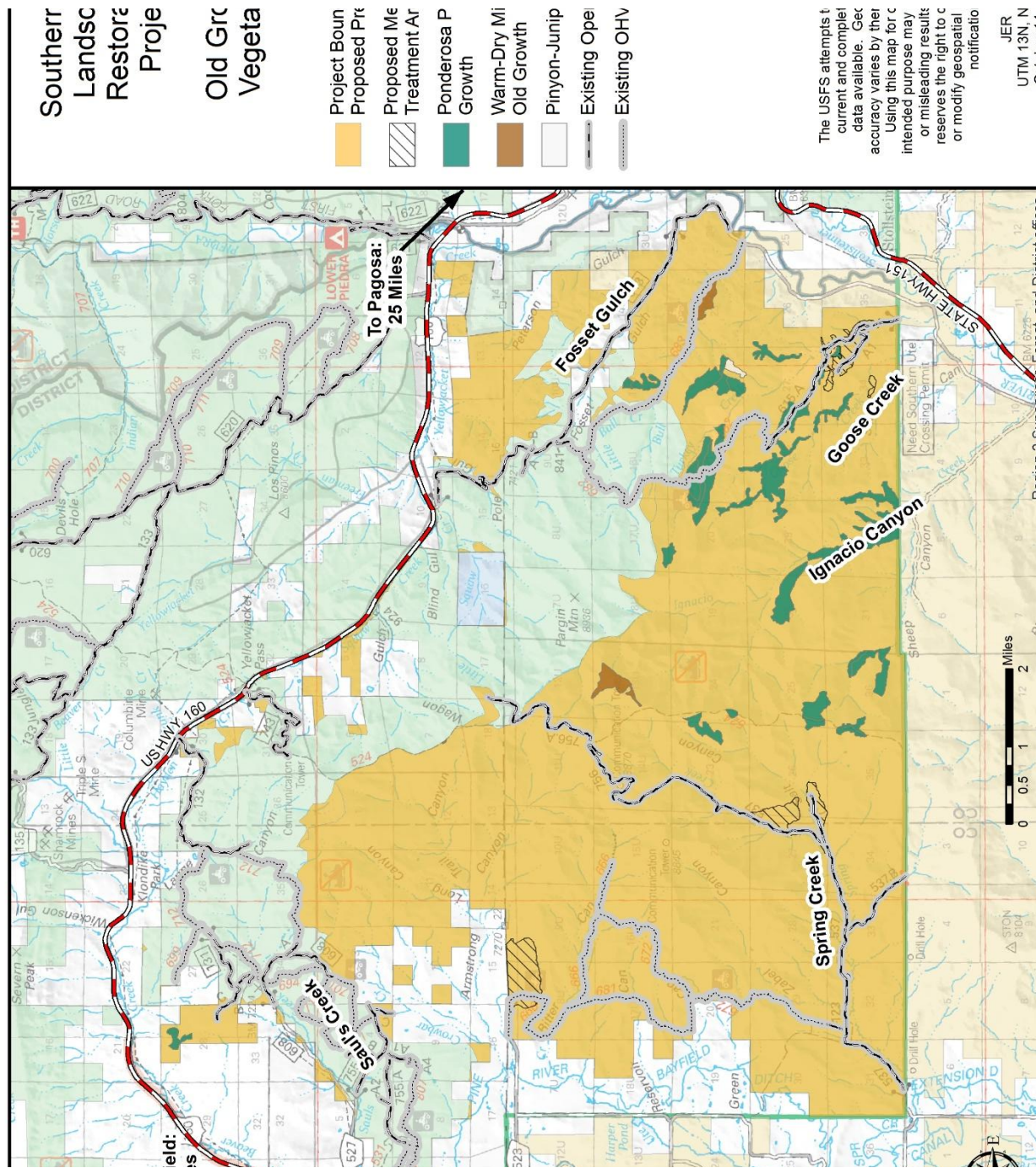
The remainder of identified old growth vegetation falls within the roadless area. Hand thinning could be a necessary activity to meet broader prescribed fire and landscape management objectives in those areas as well. Hand thinning would only be utilized in areas where ladder fuel components put mature and dominant old trees at risk.

Design elements are included in the proposed action which prohibit mechanical treatments in old growth stands to protect the ecosystem as a whole within those stands. In addition, old growth stands would be identified and analyzed in the field prior to individual activity implementation (burn plans, contracts, or in-house work plans), and hand thinning treatments would be prescribed if stand conditions warrant it.

The proposed action of managing for complexity and old growth recruitment in roadless areas will help to move the forest towards the desired conditions in the Forest Plan. Hand thinning and prescribed fire within old growth stands will also help to maintain their status of old growth structure and old trees within the landscape, and will protect them from high intensity fire while more natural fire is being re-introduced to the landscape.

The only other management project that has impacted old growth in the project area is a natural gas project which disturbed approximately 2.5 acres within an old growth stand in Goose Creek due to building a road; however, impacts to the old growth trees themselves were minimal because the road was threaded between trees. There are no other reasonably foreseeable projects that would impact old growth in the HD Mountains. Overall, any potential negative impacts from the proposed action added to the impacts from the gas development project would be far outweighed by the benefits to old growth which this project anticipates.

Figure 4. Old Growth



Noxious Weeds and Invasive Plants

Noxious weeds are defined as non-native invasive plants that displace desirable vegetation and degrade natural and agricultural lands (CWMA 2014). The Colorado Department of Agriculture has three noxious weed designations: Class A (weeds targeted for eradication within the state), Class B (weeds that are to be managed for containment), and Class C (weeds where optional, more intensive management can be undertaken by local organizations, such as by counties). There are also additional species on a “watch list.” These are species that have been determined to pose a potential threat to the agricultural productivity and environmental values of the lands of the state.

Noxious weed management on the San Juan National Forest is performed in compliance with the Decision Notice/Finding of No Significant Impact for Noxious Plant Control Program for the San Juan/Rio Grande National Forests (USDA 1996, Stiles 2012) and Invasive Species Action Plan (USDA 2013a). The program uses an integrated approach that is based on four methods of control: manual, mechanical, biological, and chemical

Noxious weeds are found scattered throughout the analysis area with concentrations in disturbed areas and along roads and trails in the Southern HD Mountains, Ignacio Canyon, Spring Creek, and Goose Creek areas. There are 1,653 acres of inventoried noxious weeds in the analysis area (Table 1). The predominating weed species are Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), and common mullein (*Verbascum thapsus*). Noxious weed treatments occur annually within this analysis area and across the landscape though not every infestation is treated, and weeds continue to invade new areas.

Table 1. Surveyed noxious weeds in the project area

Scientific Name	Common Name	Colorado Dept. of Agriculture Category	Surveyed Acres in Project Area Containing Species
<i>Cirsium arvense</i>	Canada thistle	List B	1504
<i>Carduus nutans</i>	musk thistle	List B	860
<i>Verbascum thapsus</i>	common mullein	List C	640
<i>Onopordum acanthium</i>	Scotch cottonthistle	List B	221
<i>Cynoglossum officinale</i>	gypsy flower	List B	194
<i>Cirsium vulgare</i>	bull thistle	List B	126
<i>Rhaponticum repens</i> (syn. <i>Acroptilon repens</i>)	Russian knapweed, hardheads	List B	121
<i>Tribulus terrestris</i>	puncturevine	List C	96
<i>Bromus tectorum</i>	cheatgrass	List C	37

Scientific Name	Common Name	Colorado Dept. of Agriculture Category	Surveyed Acres in Project Area Containing Species
<i>Convolvulus arvensis</i>	field bindweed	List C	25
<i>Leucanthemum vulgare</i>	oxeye daisy	List B	10
<i>Salsola tragus</i>	prickly Russian thistle	Not listed	7
<i>Linaria vulgaris</i>	Yellow toadflax, butter and eggs	List B	4
<i>Cardaria draba</i> (syn. <i>Lepidium d.</i>)	hoary cress, whitetop	List B	2
<i>Arctium minus</i>	lesser burdock	List C	2
<i>Cichorium intybus</i>	chicory	List C	1
<i>Kochia scoparia</i>	burningbush	Not listed	1
<i>Aegilops cylindrica</i>	jointed goatgrass	List B	<1
<i>Halogeton glomeratus</i>	Halogeton, saltlover	List C	<1

The proposed action has the potential to spread invasive species. Large machinery, overland travel, and soil disturbance (log landings, bladed roads or trails, fire line construction and/or maintenance) may increase potential for existing or new weeds to spread in the project area. However, the proposed action includes design elements to pre-treat noxious weeds in areas of ground disturbance (e.g., landings and mastication units). Design elements also include post treatment, inventory, monitoring, and treatment of noxious weeds as necessary after project completion. Blading of overland access routes will generally be avoided. If isolated areas require blading, these are to be rehabilitated post-treatment. These measures should serve to minimize infestations resulting from mechanical treatments and fire management.

In general, we expect noxious weeds will continue to spread from existing populations by a variety of vectors including livestock, wildlife (including birds), vehicles, recreationists, wind, and water, and therefore continue to be present in the analysis areas in both the short and long term, even if current levels of weed treatment are maintained. Thus, while the proposed action may result in an increased risk of spread of noxious weeds compared to the no action alternative, we anticipate that this risk is largely mitigated by the associated design measures to prevent, treat, and monitor any resulting infestations.

Threatened or Endangered Flora Species

There are two federally listed endangered plant species with potential to occur on the San Juan National Forest (USFWS 2020), Knowlton's cactus and Pagosa skyrocket. Neither of

these are known to occur on the Columbine Ranger District or the project area. Furthermore, there is no potential habitat for either endangered species within the project area, therefore they are not discussed further in this document and a determination of “no effect” was made for both species. Further details are contained in a Biological Evaluation in the project record.

Region 2 Sensitive Flora Species

The sensitive species addressed in this document are from the December 18, 2018 Rocky Mountain Region Sensitive Plant list (*USDA 2018*). There are 24 sensitive plant species known or suspected to occur on the San Juan National Forest that were considered for this project. See Table 2 for list of these species along with a description of their habitats and potential to occur within the project area. Habitat and distribution for each species was reviewed, and 19 species were then discounted and dropped from further review due to the following reasons: 1) species not expected to occur in La Plata or Archuleta Counties or considered narrowly endemic only to Dolores County, 2) lack of Mancos shale soil, or 3) elevation not in species’ range, 4) lack of bogs, fens or wetland areas, or 5) lack of shale soils.

The five remaining species that have occupied or potential habitat within the project area are discussed below and are *Astragalus iodopetalus* (violet milkvetch), *Astragalus missouriensis* var. *humistratus* (Missouri milkvetch), *Astragalus proximus* (Aztec milkvetch), *Cypripedium parviflorum* (yellow lady’s slipper), and *Epipactis gigantea* (stream orchid, giant helleborin). A Biological Evaluation conducted for the project contains more details regarding descriptions, habitat, and distributions of these species; it can be found in the project record.

Geographic information system (GIS) data from the Natural Resources Conservation Service and Forest Service Databases was consulted to consider soil characteristics. The analysis area is dominated by Corta Silt Loam, Carracas Loam, Nunn Loam and Sandstone outcrops. Collectively, these four soil types cover over 87% of the project area. GIS data from the Colorado Natural Heritage Program (*CNHP 2020*) and from the Southwest Environmental Information Network (*SEINet 2021*) was reviewed to determine known populations of threatened, endangered, and sensitive species within the project area. Based on these data sources, two Region 2 sensitive plant species are known to occur within the project area: *Astragalus missouriensis* var. *humistratus* and *Astragalus proximus*.

Table 2. Region 2 sensitive plant species on the SJNF, their habitats, and project effects

Species	Habitat	Potential to occur in Project Area (PA)	Determination
Non-Vascular			
<i>Sphagnum angustifolium</i> sphagnum	As floating mats, carpets, and/or hummocks in fens, open mires, sedge fens and muskegs	No—significant fens and wetlands do not occur in the PA	No effect
<i>Sphagnum balticum</i> Baltic sphagnum	Abundant in hollows and floating mats in raised bogs and poor fens; low to high elevation	No—significant fens and wetlands do not occur in the PA	No effect

Species	Habitat	Potential to occur in Project Area (PA)	Determination
Monocots			
<i>Carex diandra</i> lesser panicled sedge	On floating and non-floating mats of peat, at pond edges, on hummocks in open shrub and sedge meadows; 6,100 –8,600 feet.	No—significant fens and wetlands do not occur in the PA	No effect
<i>Cypripedium parviflorum</i> yellow lady's slipper	Ponderosa pine, Doug-fir, aspen and spruce-fir forest; on the San Juan has been found in pine/oak stand at 8,000 feet.	Yes—potential habitat may exist in the PA	May affect individuals
<i>Epipactis gigantea</i> giant helleborine orchid	Decomposed sandstone; sandstone seeps; nutrient rich habitats with moisture (springs, seeps, streams); <8,000 feet	Yes—potential habitat may exist in the PA	May affect individuals
<i>Eriophorum chamissonis</i> Chamisso's cottongrass	Montane swamps and bogs at high elevations. 10,400-12,000 feet	No—found in elevations higher than the PA	No effect
<i>Eriophorum gracile</i> slender cotton-grass	Sedge meadows and floating bogs in saturated soil to shallow standing water at 6,900 – 8,000 feet	No—significant fens and wetlands do not occur in the PA	No effect
<i>Triteleia grandiflora</i> largeflower triteleia	Ponderosa pine forest. 7,900 – 8,000 feet	No—disjunct population occurrence; not expected to occur in La Plata or Archuleta counties	No effect
Dicots			
<i>Aliciella sedifolia</i> (<i>Gilia sedifolia</i>) stonecrop gilia	Alpine; dry, rocky gravelly talus of tuffaceous sandstone. ~12,000+ feet	No—found in elevations higher than the PA	No effect
<i>Astragalus iodopetalus</i> violet milkvetch	dry stony hillsides, commonly on granite, often about oak thickets, in the pinyon-juniper and ponderosa pine zones, in oak-pinyon forests, or among sagebrush. 6,500 - 7,300 feet	Yes—potential habitat may exist in the PA	May affect individuals
<i>Astragalus missouriensis</i> var. <i>humistratus</i> Missouri milkvetch	Flat, shale meadows and on shallow slopes, including roadsides and other disturbed areas. Mancos Shale soils. 6,900-8,350 feet	Yes—PA contains a previously surveyed population	May affect individuals
<i>Astragalus proximus</i> Aztec milkvetch	Mesas, bluffs, & low hills in sandy, often alkaline, clay soil in sagebrush and pinyon juniper. Lewis or Mancos shale, <6500 feet	Yes—PA contains a previously surveyed population	May affect individuals

Species	Habitat	Potential to occur in Project Area (PA)	Determination
<i>Draba smithii</i> Smith whitlow-grass	Talus slopes, in crevices and between rocks in shaded protected sites. 8,000-11,000 feet	No—no substantial talus slope habitats at these elevations in the PA	No effect
<i>Drosera anglica</i> roundleaf sundew	On floating and non-floating mats of peat in fens and sedge fens at 7,900 – 8,500 feet	No—significant fens and wetlands do not occur in the PA	No effect
<i>Gutierrezia elegans</i> Lone Mesa snakeweed	Pinyon-juniper, semi-desert shrubland, sagebrush (barren Mancos shale outcrops). 7,500-7,800 feet	No—considered a narrow endemic to Dolores County	No effect
<i>Lesquerella pruinos</i> (<i>Physaria p.</i>) frosty or Pagosa bladderpod	Mancos shale; ponderosa pine, Gambel oak. 6,800 – 8,000 feet	No—PA does not contain Mancos shale habitats	No effect
<i>Packera mancosana</i> Mancos Shale packera	Mancos Shale barrens in Dolores County. 7,500 feet	No—considered a narrow endemic to Dolores County	No effect
<i>Parnassia kotzebuei</i> Kotzebue's grass-of-parnassus	Moist seeps, grassy, wet tundra on thin clay soil, and moist ledges below steep talus slopes. 10,000 – 12,000 ft.	No—found in elevations higher than the PA	No effect
<i>Physaria pulvinata</i> cushion bladderpod	Pinyon-juniper, semi-desert shrubland, sagebrush; barren argillaceous (Mancos) shale outcrops	No— PA does not contain Mancos shale habitats	No effect
<i>Physaria scrotiformis</i> West Silver bladderpod	Alpine (barren exposure of Leadville limestone). West Silver Mesa. 11,500-12,000 feet	No—found in elevations higher than the PA	No effect
<i>Salix arizonica</i> Arizona willow	Subalpine wet meadows & streamsides. 10,000 – 11,500 ft.	No—significant fens and wetlands do not occur in the PA; found in elevations higher than the PA	No effect
<i>Salix candida</i> silver or sageleaf willow	On floating mats & in bogs, fens and willow thickets around ponds on wet to saturated, histic soils. 8,800 – 10,600 ft.	No—significant fens and wetlands do not occur in the PA	No effect
<i>Utricularia minor</i> lesser bladderwort	Fens, bogs, edges of ponds, and slow-moving streams at high elevations near 11,000 feet	No—found in elevations higher than the PA	No effect
<i>Xanthisma coloradoense</i> (<i>Machaeranthera c.</i>) Colorado tansy aster	Gravelly soils; subalpine tundra; limestone, dolomite, shale or other calcareous substrates. 9,000 – 11,000 feet	No—found in elevations higher than the PA	No effect

Astragalus iodopetalus (violet milkvetch)

A. iodopetalus is known from southwestern Colorado and northern New Mexico. There are two known locations on the SJNF on the Pagosa Ranger District (*SEINet 2017*), including at nearby Chimney Rock. There are no known populations within the project area, but potential habitat may exist.

Potential effects could include trampling or uprooting of individual plants by tools, vehicles, equipment or foot-traffic. Prescribed fire effects may include sterilization of soils from burning piles or large amounts of slash that have high residence time and high temperatures during burning. Effects from the proposed action are likely to be localized affecting some individuals but not populations.

While there are no known populations of *A. iodopetalus* within the project area, because no preliminary surveys were conducted, we assume that potential habitat may be occupied within the project area. As such, we determine that the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide” for *Astragalus iodopetalus*.

Astragalus missouriensis var. *humistratus* (Missouri milkvetch)

Astragalus missouriensis var. *humistratus* is known from just 15 locations worldwide, all within the Upper San Juan Basin in Colorado and New Mexico. There are five known populations on the San Juan National Forest in Archuleta County. The Pine-Piedra trail, which marks the northeastern border of the project area, transects a population of *A. missouriensis humistratus* as identified by the Colorado Natural Heritage Program Rare Plant Survey for San Juan NF (*Lyon 2001*) in an area of approximately eight acres.

The proposed action includes project design features intended to avoid or reduce impacts to sensitive species. Crews and operators will also be provided with identification materials of special status plant species so they may avoid unintentionally trampling or uprooting these species. In this case, the known distribution of *Astragalus missouriensis* var. *humistratus* in the project area is limited to approximately eight acres within the treatment area. Providing location and identification information is likely to be effective in helping avoid adverse impacts that could occur from during prescribed fire operations. Additional measures serve to reduce potential impacts from noxious weeds by treating areas of ground disturbance, cleaning and inspecting equipment, on post treatment monitoring (see Appendix A). In general, we anticipate that any adverse effects are likely to be localized and affect individuals rather than whole populations.

Because *A. missouriensis humistratus* generally occupies openings or on sparsely vegetated soils, prescribed fire may affect some individuals, but poses a relatively low risk to the population. No mechanical treatments, handlines, or new trails are proposed in or near occupied *A. missouriensis humistratus* habitats. However, the known populations occur along the Pine-Piedra trail, which could serve as a control line for prescribed fire operations. Should control line work occur in occupied habitat, potential effects may include trampling or uprooting of individual plants by tools, vehicles, equipment or foot-traffic on occupied sites along the Pine-Piedra trail; however, adverse effects from these

activities should be reduced through implementing the design measures described above. Ultimately, the promotion of more open, uneven-aged stand conditions may result in improved habitat for *A. missouriensis humistratus* which makes use of such openings.

Since there are potential direct and indirect effects and potential habitat was not surveyed at the appropriate time of year, it is assumed that the species may be present. Therefore, we determine that the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide” for *Astragalus missouriensis* var. *humistratus*.

Astragalus proximus (Aztec milkvetch)

Astragalus proximus is known to occur in La Plata and Archuleta Counties in southwestern Colorado as well as in northwestern New Mexico. There is a large population of *A. proximus* at the Chimney Rock National Monument (approximately 850 individuals) to the east of this analysis area. There is a known population of *A. proximus* north of the analysis area just north of Highway 160. Within the proposed action area, previous surveys documented by the Colorado Natural Heritage Program has identified approximately 30 acres of occupied habitat north of the Spring Creek Road in the southwestern corner of the project area (Goshorn 2011).

The proposed action includes project design features intended to avoid or reduce impacts to sensitive species. Crews and operators will also be provided with identification materials of special status plant species so they may avoid unintentionally trampling or uprooting these species. Additional measures serve to reduce potential impacts from noxious weeds by treating areas of ground disturbance, cleaning and inspecting equipment, on post treatment monitoring (see Appendix A).

While prescribed fire could occur throughout the project area, it will largely focus on ponderosa pine stands. Should prescribed fire reach occupied habitat, it may adversely affect some individual plants. However, because the species is associated with sandy, alkaline soils along sparsely vegetated bluffs, we do not anticipate prescribed fire to affect population viability within the project area.

No mechanical treatments or handlines are proposed in or near occupied *A. proximus* habitats. However, the species does occur near the Spring Creek Road which may serve as a control line for prescribed activities. Should overland travel or control line maintenance occur near occupied *A. proximus* habitat, effects could include trampling or uprooting of individual plants by tools, vehicles, equipment or foot-traffic. Indirect effects of fire line maintenance, use of overland travel routes, and other activities associated with the proposed action could increase soil erosion and spread of noxious weed infestations. In general, we anticipate that any adverse effects are likely to be localized and affect individuals rather than whole populations.

Because there are design criteria in the proposed action which aid in mitigating potential impacts to this species, we determine that the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause

a trend to federal listing or a loss of species viability range wide” for *Astragalus proximus*.

Cypripedium parviflorum (yellow lady’s slipper)

Surveys from the Colorado Natural History Program record two documented occurrences of *C. parviflorum* on the Columbine Ranger District (Hanson 2005). SEINet records voucher specimens collected from at least seven locations on the district, with the nearest to the project area collected near the Lemon Reservoir dam (SEINet 2021).

C. parviflorum has not been found within the analysis area, and no specific surveys for this species have occurred, but potential habitat could be impacted by fire line construction and activities associated timber sales and mechanical fuels reduction. Potential direct effects include trampling or uprooting of individual plants by tools, vehicles, equipment or foot-traffic. Potential direct effects may include sterilization of soils from burning piles or large amounts of slash that have high residence time and high temperatures during burning. Indirect effects of fire line construction and use of overland travel routes could be an increase in soil erosion and spread of noxious weed infestations. In general, we anticipate that any adverse effects are likely to be localized and affect individuals rather than whole populations

Fire line construction and maintenance, foot and machine traffic, and activities associated with mechanical thinning may impact individuals of this species. However, this species is distributed across much of the United States and Canada and occurs in many areas not regularly impacted by forest restoration activities. Therefore, we determine that the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide” for *Cypripedium parviflorum*.

Epipactis gigantea (stream orchid, giant helleborin)

SEINet records include several vouchers collected near seeps and spring Lower Piedra Campground, located just east of the project area (SEINet 2021). While there are no known occurrences of stream orchid within the Southern HDs project footprint, there are numerous seeps and springs, and ephemeral streams; thus, we presume that some could be occupied within the action area.

While some activities associated with fire line construction and maintenance, overland vehicle or foot traffic, and mechanical treatments have the potential to affect stream orchid, we anticipate very little threat to the species as numerous design elements direct activities to avoid streams, seeps, springs, or other wetlands (see Appendix A, Watershed Design Elements).

Prescribed fire may adversely affect some stream orchids should fire reach occupied habitats. However, prescribed fire is applied during weather and fuels conditions that result in lower-intensity burns. Such burns are less likely to impact native plants, especially those that occur in naturally wet areas. Introducing prescribed fire along with some mechanical thinning is likely to reduce the potential for high-intensity or uncharacteristic fire that could degrade soil and watershed condition. Ultimately, we

anticipate that the proposed actions will improve overall habitat conditions for stream orchid.

While we are unaware of any stream orchid populations in the project area, potential habitat could be affected by prescribed fire activities. However, this species is distributed across much of the western United States and Canada and occurs in many areas not regularly impacted by forest restoration activities. Therefore, we determine that the proposed action “may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide” for *Epipactis gigantea*.

Hydrology

Watershed Conditions

The 35,000-acre analysis area falls within nine different watersheds in the Upper San Juan River Basin, based on USGS 6th level hydrologic unit code boundaries (Figure 5). The affected watersheds, the proposed treatment acres, and the percentage of each watershed that could be affected if the proposed actions are completed are identified in Table 3.

Watershed condition and vulnerability to disturbance have been analyzed on the San Juan National Forest in two ways. The first method, the *Aquatic, Riparian, and Wetland Ecosystem Assessment*, was completed to describe the aquatic and terrestrial ecological characteristics of watersheds on the Forest, as well as the influence upon them by anthropogenic activities (Winters 2006). This assessment also determined the sensitivity of watersheds to human-caused disturbance based on certain physical characteristics like slope, elevation, geology, dominant channel substrate, and precipitation regime. The Middle Beaver Creek and Yellowjacket Creek watersheds are currently identified by the current Forest Plan as having the “highest levels of anthropogenic disturbance.” The Navajo Reservoir, Ute Creek and Yellowjacket Creek watersheds are currently identified as being “most sensitive to anthropogenic disturbance” in the Forest Plan.

A second method of watershed condition classification, the *Watershed Condition Framework*, was completed for all 6th-level Hydrologic Unit Code delineated watersheds on the Forest in 2012 and then again for the ones within this analysis area in 2021 (USDA 2011b). The classification scheme includes Class 1: Functioning Properly, Class 2: Functioning at Risk, and Class 3: Impaired Function. A Class 1 designation describes a watershed with high geomorphic, hydrologic, and biotic integrity relative to natural potential condition, signifying that the watershed is functioning properly. Four of the nine of watersheds within the analysis area were identified to be *Properly Functioning* during the initial assessment in 2012, while only one was identified in the 2021 reassessment. A Class 2 designation describes a watershed with some departure in geomorphic, hydrologic, and biotic integrity relative to natural potential condition, signifying that the watershed is at risk. Four of the nine of watersheds within the analysis area were identified to be *Functioning at Risk* during the initial assessment in 2012, but that number moved up to seven in the 2021 reassessment. It should be noted that the Sambrito Creek

watershed was not reassessed in 2021 because it is primarily outside of the Forest boundary and didn't meet criteria identified during the reassessment process. The watershed condition designations from both the initial 2012 assessment and the 2021 reassessment are summarized in Table 3.

The proposed prescribed fire and silvicultural treatments are intended to restore healthy stand density, structure, and diversity. Without implementation, the long-term goal of increasing resistance to changing environmental conditions and resiliency of watershed condition and aquatic ecosystems would not occur.

Figure 5. Water Resources

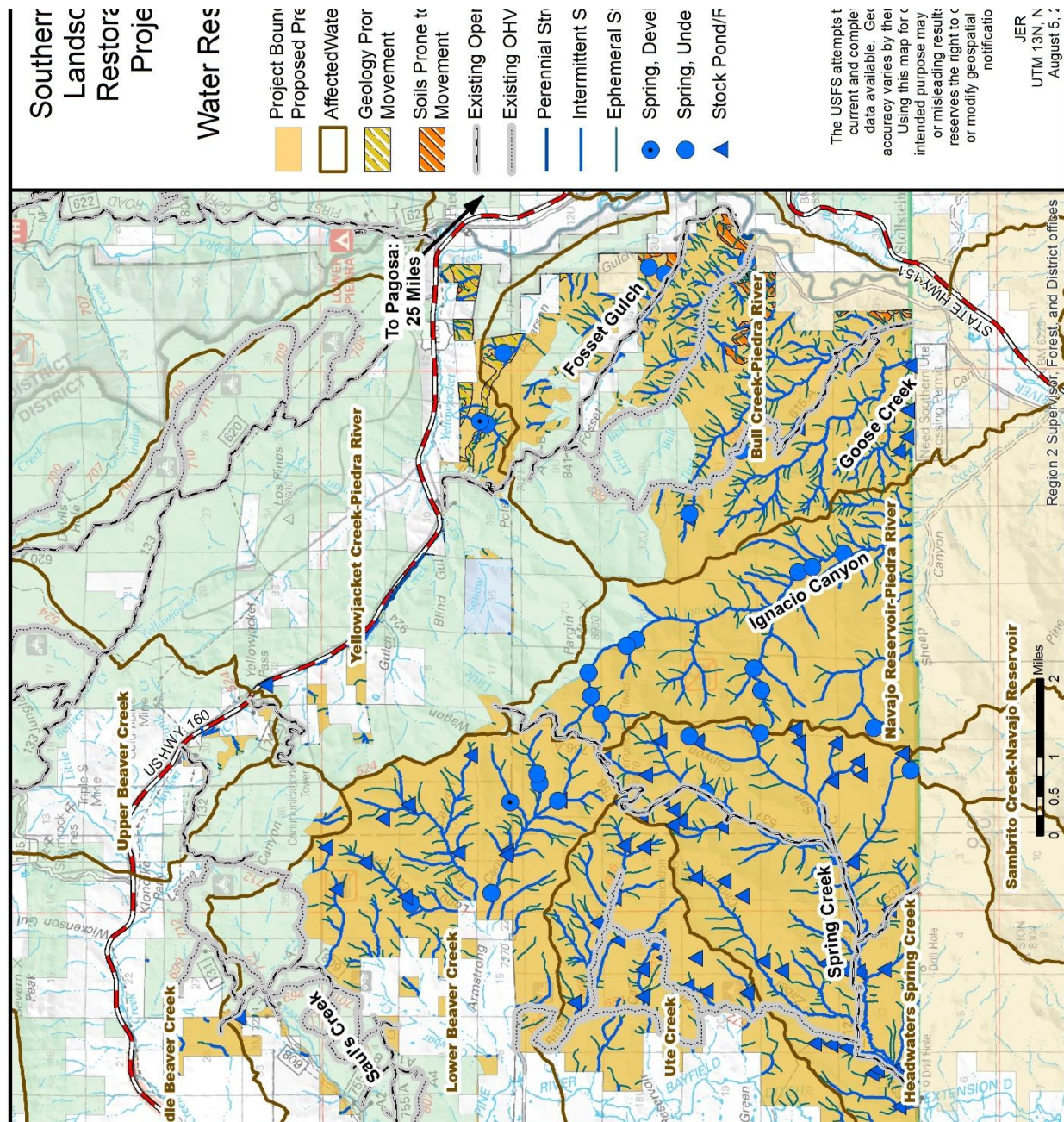


Table 3. Affected Watersheds

Watershed Name	Hydrologic Unit Code (HUC6)	Total Acres in Watershed	Proposed Acres of Prescribed Fire	Percentage of Watershed Proposed for Prescribed Fire	Proposed Acres Mechanized or Hand Thinning	Percentage of Watershed Proposed for Mechanical Treatment	2013 SJNF LRMP Highest Levels of Anthropogenic Disturbance	2013 SJNF LRMP Most Sensitive to Anthropogenic Disturbance	2012 Watershed Condition Framework Assessment Rating	2021 Watershed Condition Framework Assessment Rating
Bull Creek-Piedra River	140801020502	17,144	7,711	45%	353	2.1%			Functioning At Risk	Functioning At Risk
Headwaters Spring Creek	140801011504	18,921	8,453	45%	192	1.0%			Functioning At Risk	Functioning At Risk
Lower Beaver Creek	140801011303	16,875	6,170	37%	217	1.3%			Unassessed	Functioning At Risk
Middle Beaver Creek	140801011302	12,482	412	3%	0	0%	X		Properly Functioning	Functioning At Risk
Navajo Reservoir-Piedra River	140801020503	30,694	6,349	21%	0	0%		X	Properly Functioning	Functioning At Risk
Sambrito Creek-Navajo Reservoir	140801011601	24,803	12	0.05%	0	0%			Properly Functioning	Unassessed
Upper Beaver Creek	140801011301	1,2992	132	1%	0	0%			Properly Functioning	Functioning At Risk
Ute Creek	140801011503	10,863	4,332	40%	0	0%		X	Functioning At Risk	Properly Functioning
Yellowjacket Creek-Piedra River	140801020501	20,190	1,007	5%	0	0%	X	X	Functioning At Risk	Functioning At Risk

Prescribed fire is proposed in all nine watersheds within the analysis area and makes up anywhere from 1-45% of each watershed. Mechanical and/or hand thinning treatments are proposed in the Bull Creek, Headwaters of Spring Creek and Lower Beaver Creek watersheds. Respectively, there is 353, 192, and 217 acres identified for thinning, which ranges from 1-2.1% of each of these watersheds. Altering forest structure and stand density would affect watershed form and function to a degree. The prescribed fire and mechanical treatments proposed would change the way rain-dominated precipitation events function and snowfall accumulates and melts within this landscape. This could result in altered runoff timing, peak flows, and nutrient/sediment loading in these drainages. Snowpack accumulation and melt processes are highly variable across a landscape and depend on factors like elevation, slope, aspect, canopy density, wind and solar input. Decreasing tree canopy through prescribed fire, mechanical thinning and harvest allows more falling snow to reach the ground because it reduces canopy interception and sublimation rates. The proposed reduction in basal area and overall stand density would likely increase snowpack depths within this landscape. Springtime ablation rates would be driven by the amount of solar radiation input and wind events but melt rates would likely increase due to reduced shading. The combination of a deeper surface snowpack and quicker melt processes could produce earlier and more intense snowmelt runoff. Climate change projections for the San Juan Mountains, however, predict that snowpack would likely decrease with projected temperature increases at elevations found within this landscape (Nydick 2012). This could buffer the overall change to snowpack accumulation and melt processes from the proposed prescribed fire and mechanical treatments. Overall impacts would be relative to the degree and extent of implementation within the watershed. Research has shown that forest canopy reductions in greater than 15% of a watershed can have discernable increases in water yields, particularly during peak spring runoff timeframes (MacDonald 2003). Implementing the proposed actions may cause short-term increases in peak snowmelt runoff volumes until vegetation regrowth occurs and evapotranspiration rates return to pre-disturbance levels. In addition, larger runoff volumes and shortened residence times from high-intensity rainfall events may be expected until surface vegetation is re-established, and soil characteristics return to pre-disturbance conditions.

Current watershed conditions are the result of many natural and anthropogenic activities occurring within the analysis area, including managed grazing, natural and prescribed fire, increasing creation and utilization of roads and trails, recreation activities, drought, effects of climate change, and insect, disease and weed outbreaks. The combinations of growing use, continuing drought, warming temperatures, and increasing tree mortality have the potential to negatively affect watershed function, stability, and resilience to a great degree. Changing snowpack accumulation patterns and melt timing, along with precipitation event intensity and timing have a direct effect on water yields, ground/surface water interactions and erosion potential. Rates and numbers of dead and dying trees increased by drought, climate change, and insect and disease outbreaks would add to adverse effects. However, the silvicultural treatments proposed in this EA, in combination with the prescribed fire and silvicultural treatments described in the Fosset Gulch/Northern HDs Ecosystem Restoration EA (USDA 2016) and Vallecito-Piedra Integrated Vegetation Management Plan EA (USDA 2018a), would help restore healthy stand density, structure and diversity, increasing resiliency and resistance to changing

environmental conditions that could otherwise adversely affect water resources. The long-term adverse cumulative impacts from the proposed actions described in this EA would be minimal to water and soil resources, whereas beneficial effects would ultimately help increase watershed health and resiliency.

Soils and Roads

This landscape has a high degree of topographic variability with elevations ranging from about 6,400-8,700 feet. The average precipitation within the analysis areas varies between 15-29 inches per year, with the vast majority of that coming in the form of snow with a secondary pulse affiliated with the monsoon season in late summer/early fall. In general, the analysis area consists of moderate to steep slopes, with 9,687 acres or roughly 28% of the analysis having greater than 35 percent slopes. Portions of this landscape have soil types and geologic substrate that are prone to mass movement and many historic landslides have been previously identified within the analysis area. The analysis area is dominated by Corta Silt Loam, Carracas Loam, Nunn Loam and Sandstone outcrops. Collectively, these four soil types cover over 87% of the project area. The total acres, landscape percentage, and physical characteristics of each of these four soil types are displayed in the Table 4.

Table 4. Major Soil Types and Characteristics

Soil Series	Series Name	Slope	Acres	% of Analysis Area	Soil Characteristics
11E	Corta Silt Loam	25-65	16,547	30	Deep and well drained; very slow permeability; medium runoff; high water erosion hazard; moderate available water capacity.
4E	Carracas Loam	25-65	16,344	30	Shallow and well drained; moderate permeability; low available water capacity; rapid runoff; high hazard of water erosion; high probability of road cutbank slumping; difficult to revegetate because of low water capacity and limiting fertility.
11D	Corta Silt Loam	4-25	4,295	8	Deep and well drained; very slow permeability; slow to medium runoff; moderate water erosion hazard; moderate available water capacity.
36D	Nunn Loam	4-25	3,719	7	Deep and well drained; slow permeability; moderate available water capacity; medium runoff; moderate hazard of water erosion; high hazard of gully erosion, high shrink/swell capacity.
43	Sandstone Outcrop		2,494	5	Rapid to very rapid runoff; moderate to very high hazard of water erosion.
4D	Carracas Loam	4-25	2,238	4	Shallow and well drained; moderate permeability; low available water capacity; medium runoff; moderate hazard of water erosion; difficult to revegetate because of low water capacity and limiting fertility.
36A	Nunn Loam	0-4	1,721	3	Deep and well drained; slow permeability; moderate available water capacity; slow runoff; moderate hazard of water erosion.

Historic and current land uses have resulted in a substantial network of system and non-system roads. An extensive road network artificially connects portions of this landscape hydrologically and promotes soil transport and sedimentation in some drainages. Finally, naturally erosive soils found in parts of this project area contribute to reoccurring soil transport and sediment-loading during snowmelt and intense precipitation events that occur throughout the year. A road density analysis was completed to determine compliance with Forest Plan guideline 2.13.27, which states that in order to protect water quality and watershed function, road densities on Forest lands should not exceed 2.0 miles/square mile in any 6th-level Hydrologic Unit Code watershed. All watersheds in the analysis area except for the Upper Beaver Creek watershed currently comply with this Forest Plan guideline.

If the proposed actions are not implemented, short-term adverse impacts to soil resources would not occur and there would be no changes to the existing road network. However, long-term benefits to watershed condition would not occur if the proposed actions are not implemented. These long-term types of improvements are discussed below, and include such actions as road improvements, culvert maintenance, and rehabilitation of temporary roads.

The proposed mechanical treatments primarily occur on the Corta Silt Loam (577.3 acres) and Carracas Loam (348.8 acres) soil types, both of which have erosive characteristics. Mechanical treatments would have a short-term adverse effect on soil structure and productivity. Use of heavy equipment would alter current surface conditions and increase soil compaction. Upper soil horizons would be disrupted or displaced by removing and skidding trees to access points. Skidding, stacking, and burning of slash piles would occur on a small percentage of the project area, but these actions would result in areas of high soil compaction and decreased short-term productivity. Revegetation may be difficult in areas dominated by Carracas Loam due to its low water-holding capacity and naturally limiting fertility.

Approximately 14.5 miles of open system roads would be needed to implement the proposed actions. Improvements would be needed on much of this road network. Improvements would consist of grading, graveling and drainage work that would include culvert maintenance or replacement, grade or rolling dips, and roadside ditch maintenance. These actions would greatly reduce the amount of erosion, rutting, potholing, and soil displacement from vehicles that is currently occurring on many of these roads. The projected haul traffic would increase erosion during dry and windy conditions and displace soil from road prisms during wet but operable conditions, increasing the potential for short-term water quality degradation in the form of sedimentation. In areas where the roads are steep or close to drainages, sediment transport and delivery would increase during the implementation phase. A long-term reduction of soil displacement and sedimentation from current conditions would occur after completion of the project, when system roads would again be maintained to standard and temporary non-system roads would be rehabilitated.

There is approximately one mile of total temporary road that may be needed in the Bull Creek, Headwaters Spring Creek, and Lower Beaver Creek watersheds. Creation of

temporary roads and/or use of existing non-system roads are the proposed activities most likely to disturb stable soil and vegetative conditions, cause erosion, and increase sedimentation. Construction of new, and reconstruction of existing road prisms, would likely result in limited, short-term sediment delivery to water courses that are in close proximity. Adverse effects, however, would be minimized through the implementation of Best Management Practices. Improvements would eliminate current erosion of the road prism and limit on-going sediment input to streams from both precipitation events and vehicle use. Rehabilitation of these temporary roads after project implementation would eliminate long-term sources of erosion and sedimentation and ultimately be a benefit to watershed and soils resources, which would not occur if the project were not implemented. Under the proposed action, road densities calculated using system roads and temporary roads used less than five years would not change and would still comply with Forest Plan guidance.

Skid trails can create artificial preferential flow paths that could transport soil long distances and potentially deliver sediment directly to existing water courses. Erosion from skid trails would occur during large precipitation events, especially in steeper areas and erosive soil types. Short-term adverse impacts would include soil profile disruption, ground vegetation loss, and increased likelihood of erosion and sedimentation to water courses. These impacts would be expected until effective groundcover and vegetative conditions stabilize local soil conditions. Adverse impacts to perennial stream courses or water quality would not be expected because of buffer distances and other design criteria that would be implemented. During and immediately after treatment, additional erosion would be expected to occur on compacted areas like landings and staging areas that are void of vegetation. Sedimentation is not expected to reach stream channels due to the establishment of buffer zones to perennial water sources. No water or riparian areas would be directly impacted by skid trails or landings. Water and soil impacts from the projected operating season would be directly tied to snowpack levels, precipitation events and soil saturation conditions. Highly erosive soils could limit operations to a great extent during early season thaw and late summer monsoons. Winter operations would decrease the potential of soil compaction and displacement from machinery and likely promote higher sprouting potential and quicker vegetative regrowth.

Riparian Conditions, Stream Health, and Water Quality

There are no municipal surface or groundwater sources within or directly adjacent to the analysis area. Water quality impacts to surface water resources are discussed below, but impacts to shallow and/or deep aquifers by the proposed actions are not expected or analyzed in this EA.

The surveyed streams and water bodies within the analysis area have been classified by the State of Colorado as currently meeting the Agriculture, Cold Water Aquatic Life, Recreation and Water Supply beneficial uses. Additionally, there are no stream segments or water bodies within the analysis area that are on the most recent 303(d) List of Impaired Waters (*CDPHE 2020*).

The USGS National Hydrography Datasets indicate that there are approximately two miles of perennial watercourses within the analysis area, including small segments of

Beaver Creek, Saul's Creek, Squaw Creek and Yellowjacket Creek. In addition, there are approximately 145 miles of intermittent, and approximately 152 miles of ephemeral watercourses within the project area. There are also a total of 30 known springs/seeps and 64 stock ponds or reservoirs within the analysis area (Figure 5). A robust field effort over the past decade has identified the current physical location and condition of these surface and groundwater resources. Most of the springs and seeps in this landscape are functional, but most show signs of neglect and heavy use by cattle and wildlife. Field surveys in 2018-2020 indicate that drought conditions have caused intensified use and subsequent impacts at most of these locations and flow rates were either lower-than-normal or completely dry.

There are no known or previously mapped wetland areas in or immediately adjacent to the analysis area, but there are approximately 690 acres of different riparian ecological communities within the project area. These are almost always associated with stream courses, springs/seeps and low-lying swales in this landscape and range from highly saturated with considerable organic matter to mesic meadows that dry out by July. Field surveys completed in 2018-2020 found that most riparian vegetation abundance and diversity were generally decreasing from previous surveys. This is likely due to a combination of recent drought conditions and grazing impacts. Riparian conditions and stream health are dependent on factors such as geology, vegetation, climate, and the effects from land-use. Current and historical land use activities, including road building, logging, livestock grazing, and recreation have negatively affected most of the watersheds within the analysis area. These activities have caused discrete areas of channel incision, streambank instability and riparian degradation. As a result, the geomorphic, hydrologic, and biotic integrity of some of the drainages are reduced, relative to their natural potential condition. *Robust*, *at-risk*, and *diminished* stream health classes are used to assess long-term stream health and impacts from management activities. Past and recent field surveys found that drainages within the analysis area range across all three health classes, but most stream systems currently fall into the *at-risk* or *diminished* classes. Stream and riparian conditions throughout the analysis area were resurveyed in 2018 using the Proper Functioning Condition protocol (BLM 2015). Overall ratings ranged from *non-functional* to *proper functioning*, with the majority falling into the *functional-at-risk* category. Field reconnaissance found that most channels were either dry or muddy with signs of on-going bank erosion. In general, these surveys found existing stream conditions in a diminished state compared to previous surveys and identified grazing and road/trail impacts as the primary drivers. Because the impacts from the proposed actions are generally different than those caused by grazing, these recent field surveys yield information on existing conditions and trend only.

The proposed actions meet Forest Plan standards for water and riparian resources and complies with Executive Orders 11988 and 11990, the Clean Water Act, and Drinking Water Act through application of design elements and project design. Proposed activities will comply with the guidelines in the *Watershed Conservation Practices Handbook* (FSH 2006), which outlines Best Management Practices to protect soil, aquatic, and riparian systems.

Surface and groundwater resources have been surveyed and documented within the analysis area. Mechanical treatments would not be allowed in these areas and thus, no direct impacts from harvest treatments would be expected. Riparian corridors would be left intact, which would help limit sedimentation impacts by retaining the filtration properties of near-channel vegetation. Potential increases in sediment associated with treatments would be minimal and are not expected to have a long-term effect on stream channels, springs/seeps, or riparian corridor integrity. Water quality would not be altered to a degree that the designated beneficial uses would change or be non-compliant with state or federal standards. Steeper slopes dominated by Carracas Loam and Corta Silt Loam soil types would be most erodible and water courses near these soil types have the highest likelihood of sedimentation impacts. These soil types coupled with high-intensity precipitation events typical in the area during late summer and fall could produce moderate to high yields of both coarse and fine sediment. Sedimentation would be a concern where proposed treatments occur near perennial and intermittent watercourses in the analysis area, especially in areas dominated by these erosive soils. In general, however, the proposed mechanical treatments comprise a small portion of the watershed acreage and would only occur on lower slopes, limiting erosion and sedimentation at the watershed scale.

Recreation

Recreation activities taking place in and around the project area include both motorized and non-motorized trail use such as hiking, mountain biking, horseback riding, OHV riding, mountain biking, hunting, and camping.

Most of the project area is within the HDs Landscape and the Columbine Ranger District completed travel management planning for motorized over-ground travel in that area under the *Northern San Juan Basin Coal Bed Methane EIS* and decision (USDA 2007), designating motorized trails and roads within the project area. The northwest section of the project area was analyzed under the *Beaver Meadows-Saul's Creek Landscape Travel Management EA* and decision (USDA 2010). The District also completed the *Columbine Ranger District Travel Analysis Process* (USDA 2011a).

There are about 30 miles of open system road, 2.5 miles of closed system roads, and roughly 21 miles of non-system roads in the Southern HDs Landscape Restoration project area which could be used for project operations. There are also 17 miles of motorized trails in the project area. Eight miles of the mainly non-motorized, historic Pine-Piedra stock driveway bisects this project area and is heavily utilized by horseback riders. In the winter, the area is close to motorized users because it is part of a big game winter wildlife closure for the area. There is a small, but increasing, amount of use during winter by non-motorized users for hiking, dog walking, fat tire biking, snowshoeing, cross-country skiing, and horseback riding.

The trails and roads are used by recreationalist most of the year during dry conditions. Trail and road use during big game hunting season is significantly higher than other times of the year. There are also commercial big game outfitters who set up camps that can be

in place from late August to the middle of November. The project area is heavily hunted during third and fourth rifle hunting seasons.

Parts of the project area are used by local residents for fuelwood collections. Without implementation of the project, downed wood within allowable driving distance from roads could be in limited supply. If the project is not implemented, slash and designated fuelwood areas within the timber harvest areas would not be available to help meet this demand.

The Recreation Opportunity Spectrum (ROS) is a system for classifying and managing recreation opportunities based on the following criteria: access, remoteness, naturalness, built environment, social encounters, visitor impacts, and management. The Forest Plan has ROS recreation zone maps for both summer and winter activities. The project area contains three of the ROS classes for both summer and winter; Semi-Primitive Non-Motorized, Semi-Primitive Motorized, and Roaded Natural.

Semi-Primitive ROS settings are defined as non-wilderness lands characterized by predominantly natural appearing landscape with significant opportunities for non-motorized, primitive forms of recreation. Concentrations of users are low. Opportunities are provided that allow visitors to have a high degree of interaction with the natural environment, as well as a sense of remoteness, quiet and solitude. Trail systems are designed in order to provide challenge and opportunities for self-reliance. Semi primitive ROS setting can be motorized, mechanized, or non-motorized. There are 33,863 acres of this summer classification in the project area.

The Roaded Natural ROS setting is characterized by a higher degree of development and human “footprint” than those of primitive and semi-primitive settings. Sights and sounds of human activities are common, as are encounters with other recreation users. Users should also expect the presence of active management activities, areas of adjacent and/or interspersed private lands and development, an extensive trail network, intensively developed recreation sites, and abundant access points for recreation activities. Commercial users can be common in these areas. There are 714 acres of this summer classification in the project area.

If the proposed action is not implemented, current policies would continue to guide management of the landscape. There would be no direct impacts to any recreational opportunities in the project area; however indirect effects of not implementing the project could lead to negative effects on recreation. Higher severity fires could lead to sediment run-off on trails, backslope sloughing, and faster gulley erosion and development in the trail tread. High-severity fires could also lead to displacement of animals during hunting season, as there would be less vegetation cover, and decreased visual quality from burn scars.

If the proposed action is chosen, there would be short-term intrusion into the recreational experience and the ROS settings during the implementation of the project. The proposal would result in increased noise, there would be more encounters between recreational users and timber removal operations, fall hunting experiences would be affected by

smoke from prescribed burning, short-term visual impacts from prescribed burns, and there would be increased visual intrusion during the different phases of implementing the project.

During mechanical treatment operations, there would be additional use of the Forest roads by commercial logging vehicles. Recreational users driving the roads for pleasure would see an increased use of the road by commercial operations. This increased logging traffic would present a minor increased risk of traffic accidents. Some of the designated motorized trails are near areas designated for mechanical treatments, and likely would be temporarily closed to recreational use during operations. The additional use would increase the width of the trail to the size and clearing limits of a road that could accommodate timber removal trucks. A Design Element is included in the Proposed Action to address the rehabilitation which would be needed post-operations to return the routes to trail width.

If the project is authorized as proposed, some vegetation management may be implemented using goats for grazing to remove understory and ladder fuels. The recreating public would see areas of brush and understory that are noticeably grazed. This would increase sight lines along trails, and recreationalist will see soils that have been churned up by the hooves of the goats. The public may see the goat herd or encounter the herd on the trails.

Prescribed fire burn windows are often most favorable during the fall of every year. This would be the same time as the big game hunting seasons. Commercial big game outfitters often book clients in the spring when limited hunting licenses are awarded, and non-guided hunting parties often plan their trips months in advance; these groups usually do not consider fire or resulting smoke when planning their fall hunts. The smoke would be a short-term impact to hunters and commercial outfitters. A Design Element includes required notification of outfitters when a burn is planned, in order to help address these impacts.

In preparation for the control of fire operations, Forest roads and/or Forest system trails could be used as control lines. Any fire operations could have short-term effects on recreational visitation. There could be short-term closures, fire safety issues, and increased smoke across the landscape.

The overall effect to the recreational experience of this proposal may be negative in the short-to-mid-term, but the long-term overall effect would be beneficial because of the improvement in forest health, reduced fuel loading, reduced risk if high-severity fire, and increased forest resiliency.

The population growth of La Plata County and increased tourism and outdoor travel continue to increase long-term recreational use, and therefore, affects the type of experience a user has in the project area. The proposed action is limited enough both spatially and temporally that it would not have a noticeable impact on these larger recreation trends.

Fish and Wildlife

Fish habitat and known fish populations are very limited in the project area. There is no habitat for any federally listed fish species in the project area. Water depleting activities are known to have an effect to federally listed Colorado pikeminnow and razorback sucker, located in the San Juan River downstream of Navajo Dam. In 1996, the SJNF consulted with the U.S. Fish and Wildlife Service to assess the impacts of water use and prescribed fire on the SJNF. The resulting Biological Opinion issued by the Service includes the proposed action as an annual water depleting activity and no further consultation is required for this project.

The only stream within the analysis area with populations of Forest Service Sensitive fish species is Beaver Creek with a known population of bluehead sucker. The project area only crosses Beaver Creek for approximately 1,000 feet in the northwest corner of the analysis area. As such, the direct and indirect affects would be very limited to the bluehead population in Beaver Creek, and combined with project design criteria specific to sediment reduction to stream systems, the anticipated affects would be inconsequential and discountable; therefore, a determination of “no impact” to the bluehead sucker population in Beaver Creek from the proposed action has been made. None of the other perennial streams in the analysis area are known to support fish populations. Fisheries are not discussed further in this document.

There is no habitat for any federally listed fauna species, nor is there any designated critical habitat in the proposed project area, therefore federally listed threatened, endangered, or proposed fauna species are not discussed further in this document. Determinations of “no effect” to any federally listed terrestrial wildlife species or their critical habitats were made. Details can be found in the Biological Evaluation in the project record.

The proposed project area is potentially inhabited by eleven terrestrial Forest Service Sensitive fauna species identified in the 2013 San Juan National Forest Plan: fringed myotis, Brewer’s sparrow, flammulated owl, hoary bat, Lewis’s woodpecker, loggerhead shrike, northern goshawk, northern leopard frog, olive-sided flycatcher, Monarch butterfly and western bumblebee. Brewer’s sparrow and the loggerhead shrike use open areas; Brewer’s prefers sagebrush, while shrikes need prominent perch trees among or near vegetation from which to hunt for prey. That could be sagebrush or similarly structured vegetation such as occurs in agricultural areas. Brewer’s sparrows have approximately 5,045 acres of poor-quality habitat within the project boundary.

Lewis’s woodpecker depends upon open areas with large prominent trees to nest or to use for perching. The presence of snags or trees with decay is important to this species. Approximately 17,590 acres of vegetation is suitable for Lewis’s in the proposed project boundary. Similarly, olive-sided flycatchers use open areas interspersed with perch trees that provide good vantage points for observing prey. This flycatcher does well in areas that are burnt or near riparian zones of which there are few in the proposed treatment area. The two bat species, hoary and fringed myotis, use forested areas within the project boundary for roosting during the day and forage in naturally occurring or manmade

openings. The estimate is that approximately 24,327 and 29,960 acres respectively are suitable for these two species.

Mapped northern goshawk habitat amounts to 7,286 acres. There are approximately 11,844 acres of vegetation suitable for the flammulated owl. These species would use ponderosa pine and warm-dry mixed conifer stands in the proposed project area. This proposal has approximately 27 percent ponderosa pine vegetative type. Warm-dry mixed conifer, also suitable for either species, comprises only seven percent of treatment units proposed for prescribed fire. Goshawks will hunt and rear young in forested stands, preferring to forage in the lower portions of the canopy or on the ground. They use small openings from which to ambush prey. Flammulated owls require cavity trees and those are usually in the form of dead standing trees or live trees that have a cavity previously excavated by another species. Flammulated owls roost in stands that are denser than forested stands used for locating prey.

Elk are generalists and would use the entire proposed project area throughout the year, but the preponderance of use of this area occurs in the winter. The proposed project area has 34,265 acres of winter concentration areas for elk. This area is important to the management of elk on the San Juan National Forest, as winter range areas are considered limiting on this species.

Table 5 is taken from the Biological Evaluation report and displays the effects determinations for faunal Sensitive Species that could be found on the San Juan National Forest.

Table 5. Region 2 sensitive wildlife species on the SJNF, their habitats, and project effects

Species	Potential in Project Area	Impacted	Habitat Description	Effects Determination
MAMMALS				
American marten	No	No	Mature spruce/fir and mixed conifer forests with complex physical structure.	"No impact"
Desert bighorn sheep	No	No	Rocky canyons, grass, low shrub, open habitat with adjacent steep rocky areas for escape and safety. Might occur on Dolores RD; does not occur on Columbine or Pagosa RDs.	"No impact"
Fringed myotis	Yes	Yes	Desert, grassland and woodland habitats. Roosts in caves, mines, rock crevices, buildings, and other protected sites.	"MAII" *
Gunnison's prairie dog	No	No	High mountain valleys and plateaus at 1830-3660 m; open or slightly brushy country, scattered junipers and pines. Burrows usually on slopes or in hummocks.	"No impact"

Species	Potential in Project Area	Impacted	Habitat Description	Effects Determination
Hoary bat	Yes	Yes	Associated with foliage in trees, mainly ponderosa pine, piñon-juniper and riparian forest.	“MAII” *
River otter	No	No	Stream and river riparian	“No impact”
Rocky Mountain bighorn sheep	No	No	Open or semi-open habitats, often in precipitous terrain and the adjacent benches and mesa tops, most commonly in alpine, grassland, shrub-steppe and rocky areas.	“MAII” *
Spotted bat	No	No	Low elevation piñon-juniper, shrub desert, possibly riparian.	“No impact”
Townsend’s big-eared bat	No	No	Forages in semi-desert shrublands, piñon-juniper woodlands and open montane forests. Roosts in caves, mines and mature forests.	“No impact”
BIRDS				
American bittern	No	No	Marsh, swamp, or bog with cattails, rushes, grasses, & sedges	“No impact”
Black swift	No	No	Nests behind or next to waterfalls and wet cliffs. Forages over forests and open areas.	“No impact”
Boreal owl	No	No	Mature spruce/fir and mixed conifer forested areas with preference for wet situations (bogs or streams) for foraging	“No impact”
Brewer’s sparrow	Yes	Yes	Strongly associated with sagebrush in areas with scattered shrubs and short grass; to lesser extent in mountain mahogany, rabbit brush, and bunchgrass grasslands with shrubs or large openings in piñon-juniper.	“MAII” *
Burrowing owl	No	No	Open grasslands associated with prairie dogs. Nests and roosts in burrows dug by mammals or other animals. Not known to occur on Columbine or Pagosa RDs.	“No impact”
Columbian sharp-tailed grouse	No	No	Oak-serviceberry shrublands, often interspersed with sagebrush; aspen forests; irrigated pasture. Recently reintroduced near Dolores, not known to occur on Columbine or Pagosa RDs.	“No impact”
Ferruginous hawk	No	No	Open grasslands and shrub steppe communities. Nests in tall trees or shrubs along streams or on steep slopes. Not known to nest on or near the	“No impact”

Species	Potential in Project Area	Impacted	Habitat Description	Effects Determination
			Forest, but is a winter visitor and can occur during the non-breeding season.	
Flammulated owl	Yes	Yes	Depend on cavities for nesting, open forests for foraging, brush for roosting. Occupy open ponderosa pine or forests with similar features (dry montane conifer or aspen, with dense saplings).	"MAII" *
Lewis's woodpecker	Yes	Yes	Open pine forests, burnt over areas with snags and stumps, riparian and rural cottonwoods, and piñon-juniper woodlands.	"MAII" *
Grasshopper sparrow	No	No	Grasslands. Does not breed on the San Juan National Forest	"No impact"
Loggerhead shrike	Yes	Yes	Grassy pastures that are well grazed. Nests in shrubs or small trees, preferably thorny such as hawthorn.	"MAII" *
Northern goshawk	Yes	Yes	Mature forest generalist, often found in mixed conifer/aspen stands.	"MAII" *
Northern harrier	No	No	Marshes, meadows, grasslands, and cultivated fields. Nests on the ground, commonly near low shrubs, in tall weeds or reeds, sometimes in bog; or on top of low bush above water, or on knoll of dry ground, or on higher shrubby ground near water, or on dry marsh vegetation.	"No impact"
Olive-sided flycatcher	Yes	Yes	Mature spruce/fir or Douglas-fir forests with preference for natural clearings, bogs, stream and lake shores with water-killed trees, forest burns and logged areas with standing dead trees.	"MAII" *
Purple martin	No	No	Mature pure aspen stands near streams, springs, or ponds. Breeds on Dolores RD. Not known to occur on Columbine or Pagosa RDs.	"No impact"
Sage sparrow	No	No	Large expanses of sagebrush. Found on the Dolores Ranger District but not the other districts	"No impact"
Short-eared owl	No	No	Open habitats including grasslands, marsh edges, shrub-steppe, and agricultural lands; requires taller grass cover than Northern harrier	"No impact"
White-tailed	No	No	Alpine tundra, especially in rocky areas with	"No impact"

Species	Potential in Project Area	Impacted	Habitat Description	Effects Determination
ptarmigan			sparse vegetation. Summer habitats include moist, low-growing alpine vegetation. Canopy cover of willow at winter feeding sites preferred.	
AMPHIBIANS				
Boreal toad	No	No	Wetlands in spruce/fir forest, near water and alpine meadows.	"No impact"
Northern leopard frog	Yes	Yes	Riparian and wetland areas.	"MAII" *
INSECTS				
Great Basin silverspot butterfly	No	No	Spring fed and/or sub-irrigated wetlands at low (7,500 feet or less) elevation; larval food plant <i>Viola nephrophylla</i> ; wet meadows interspersed with willows and other woody wetland species; adult nectar sources (mostly composites).	"No impact"
Monarch butterfly	Yes	Yes	Herbaceous growth with adequate nectar sources and are dependent upon milkweed plants (<i>asclepiad</i>).	"MAII" *
Western bumblebee	Yes	Yes		"MAII" *

* MAII=may impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide.

Without implementation of the proposed action, there would be no significant change in the amount and distribution of habitat for these species. It is anticipated that human actions that could cause disturbance to these species would continue to occur at the amount previously experienced. If the no action alternative were to be selected, the likelihood of a stand replacing fire, which is already high, would continue to increase. If a stand replacing fire were to occur, it would drastically change the vegetation structure and distribution. Consequently, some animal species' populations would decline in the proposed project area. For example, elk, pinyon jays and many species of small mammals would be adversely affected in the initial years following a wildfire.

The current forage-to-cover ratio, used to measure vegetative structure effectiveness for winter range, is approximately 57 percent forage to 43 percent cover. The suggested goal on winter range is 60/40, forage-to-cover. This proposal would likely not result in large changes to the forage/cover ratio but may move the proposed project area slightly in the preferred direction, which is to increase forage. As this project would reduce the

likelihood of a high intensity wildfire and improve the forage/cover ratio, this proposal is believed to be very beneficial to elk and mule deer.

The use of livestock, in this case usually goats, to establish or diminish the height and amount of vegetation in proposed fire-control lines, or to reduce oak brush and other shrubs, is expected to have effects upon vegetation similar to the application of low intensity underburns. It is anticipated that herbivory by goats would reduce ladder fuels and promote forage for ungulates in the first few years subsequent to treatment.

Other projects that either overlap or are in the vicinity of the proposed project are described in the Biological Evaluation, and include other fuels reduction projects, prescribed fires, natural gas development, hunter outfitting and guiding, and livestock grazing. Aspects of these projects and activities that may cause disturbance to one or more of the evaluated species have been minor, the projects are geographically dispersed across a large area and have occurred over the course of many years. Consequently, their affect upon a species is very minor, inconsequential, and highly unlikely. Also, because there is abundant habitat for these species well distributed throughout the project area, any affect upon their behavior has been small and localized to the particular action.

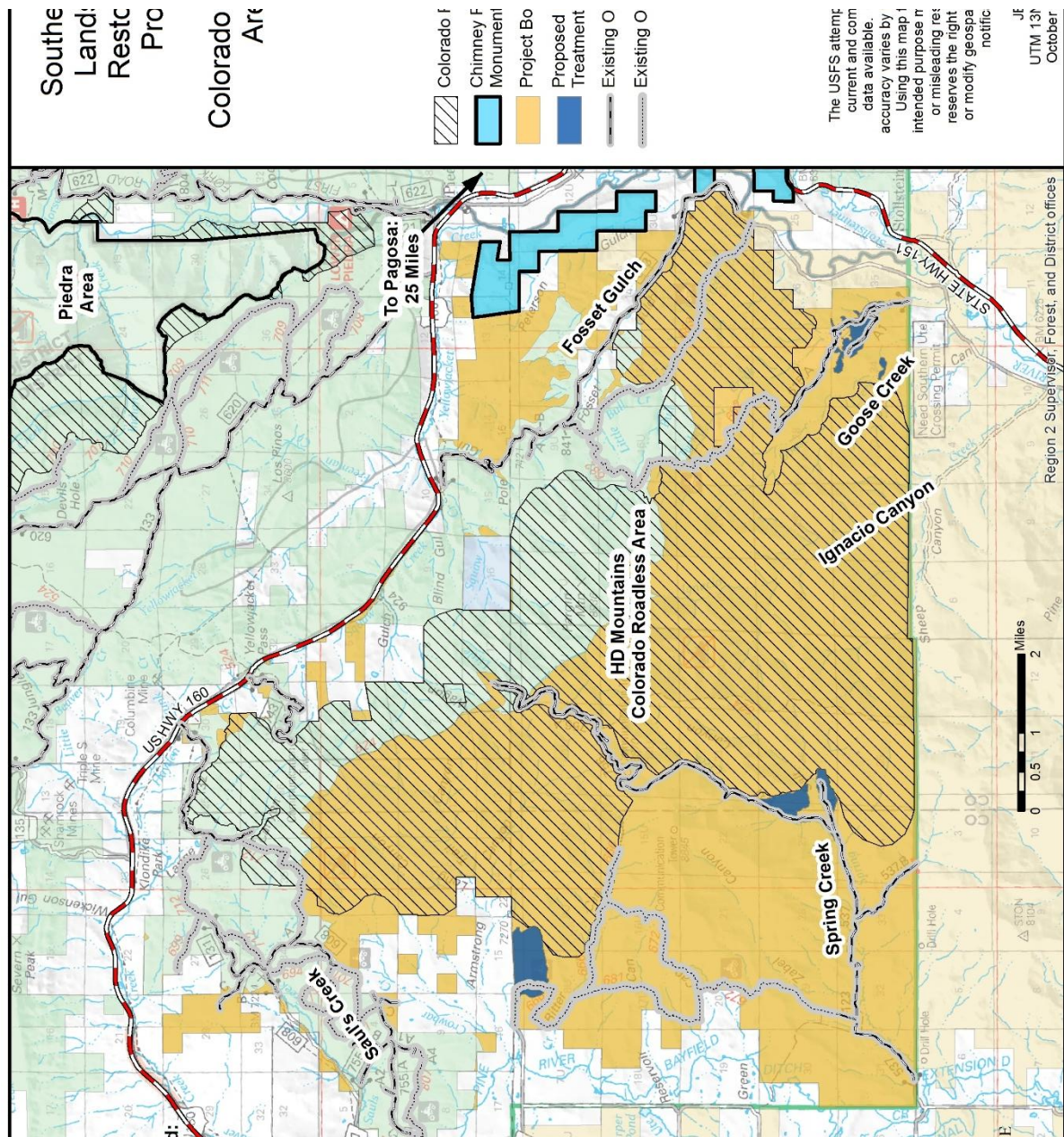
The effects of these past projects upon the evaluated species cumulatively are inconsequential and insignificant. The vegetation changes are small losses relative to the amount of suitable vegetation immediately available in adjacent stands. This proposal is likely to result in an overall decline of the potential for a stand replacing fire. Such a fire would either severely degrade or remove altogether the effectiveness of the vegetation in these areas to serve as habitat for the evaluated species.

Colorado Roadless Areas

The Forest Service has inventoried and studied roadless areas since the 1970's. Roadless Areas are generally defined as areas in a National Forest or National Grassland that (1) are larger than 5,000 acres (in the west) or, if smaller, contiguous to a designated wilderness or primitive area; and (2) contain no system roads; and (3) have been inventoried by the Forest Service for possible inclusion into the Wilderness Preservation System. Colorado Roadless Areas (CRA) inventory was updated in 2009 during rulemaking for the Colorado Roadless Rule (*USDA 2012*). CRAs are divided into Upper Tier areas and Non-Upper Tier areas, which differ in the level of protection provided under the Rule.

Approximately 19,419 acres of the HD Mountains Non-Upper Tier CRA are contained within the project area (Figure 6). The proposed mechanical treatment units are not in the roadless area and no temporary roads are proposed within the CRA. The only activities proposed in the roadless area are prescribed burning, incidental support activities for prescribed burning (hand-thinning, control lines, OHV use), and managed goat grazing.

Figure 6. Colorado Roadless Areas



The Rule describes nine resources or features that characterize and are often found in CRAs. The intent of the Rule is to protect these roadless characteristics:

1. High quality or undisturbed soil, water, and air,
2. Sources of public drinking water,
3. Diversity of plant and animal communities,
4. Habitat for threatened, endangered, proposed, candidate and sensitive species, and for those species dependent on large, undisturbed areas of land,
5. Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation,
6. Reference landscapes (none are identified in this analysis area),
7. Natural-appearing landscapes with high scenic quality,
8. Traditional cultural properties and sacred sites, and
9. Other locally identified unique characteristics.

Without implementation of the proposed action, there would be no short-term impacts to the nine roadless characteristics. However, long-term risk for high intensity wildfire would increase, and if it were to occur, many of those roadless characteristics could be harmed. Uncontrolled fire could create bare, sterilized soils that would lead to erosion and impact water quality. Wildfire tends to create more smoke for longer periods of time than managed fire, decreasing air quality. It could also lead to poor scenic quality and habitat destruction for many sensitive species.

For more specific details regarding impacts to the nine characteristics, please see other corresponding sections of this EA (e.g., Wildlife section or Soils section). Under the Proposed Action, the nine roadless characteristics would be better protected in the long-term:

1 and 2. There would be short-term impacts on soil, water and air quality during implementation, such as soil compaction on skid trails and smoke generation during prescribed burning, but these would be regulated and rehabilitated at the conclusion of the project. Refer to the Hydrology section of this EA for more detail.

3 and 4. Plant and animal diversity and habitats would ultimately be augmented by creating differing stand structures. Impacts to habitat for special status species is discussed in the Wildlife section of this EA.

5. Recreation in this landscape could be impacted by temporary area or trail closures during implementation; long-term impacts to recreation would be unnoticeable other than some burnt trees. Refer to the Recreation section of the EA.

6. This landscape is not considered a reference landscape.

7. This landscape has been actively managed for many decades, and outside of the roadless area, is in the low scenic integrity objective. The roadless area is in the high scenic integrity objective and should remain so after this project, aside from temporary visual fire effects.

8. Fuels reduction accomplished through prescribed burning will better protect traditional cultural properties and sacred sites from a high intensity fire. Refer to the Cultural Resources section of the EA.

9. Beyond the roadless area itself, old growth stands could be considered a unique characteristic. Old growth stands will be better protected from large fire by a controlled re-introduction of fire into the landscape. Refer to the old growth subsection within the Vegetation section of the EA.

Motorized use of equipment and vehicles is not prohibited under the Roadless Rule, and tree cutting is allowed in Non-Upper Tier CRA acres under exception 294.42(c)(3): “Tree cutting, sale, or removal is needed to maintain or restore the characteristics of ecosystem composition, structure, and processes.” The current condition of the ecosystem is outside the Historic Range of Variability. By conducting the proposed project, a more diverse age-class composition and stand structure will be restored, and re-introduction of natural fire processes can be accomplished. Tree cutting under this exception could include hand-thinning in isolated areas to allow restoration of natural fire processes, for example, removal of understory trees in preparation for prescribed fire in old growth stands.

Tree cutting could also occur in the roadless area under exception 294.42(5): “Tree cutting, sale, or removal is incidental to the implementation of a management activity not otherwise prohibited by this subpart.” This could include hand cutting of trees for fire fighter safety and control line construction.

The only other management activities in the HD Mountains that could occur in roadless and contribute to impacts on roadless characteristics would be rare natural gas development projects. The addition of the minimal, short-term, and beneficial impacts to roadless from the proposed action would be unnoticeable.

Cultural Resources

A Class I literature review and San Juan National Forest GIS data examination of the project APE was completed in 2021. The most frequently documented prehistoric sites have been lithic scatters and camps of unknown indigenous affiliation. These sites vary in age (Archaic through Proto Historic periods), size, material composition and artifact density and distribution. Proto-historic aged culturally modified trees (scarred or peeled trees), likely associated with Ute resource use, have also been recorded. Historic sites are predominately livestock management related, such as Spanish/Basque and Anglo American affiliated arborglyphs and tree markings, historic corrals and features (trail markers, camps) associated with the Pine-Piedra Stock Driveway. Mining features and associated cabins, wagon roads and trails, homestead cabins, and miscellaneous refuse dumps are also distributed across the project area. These findings are based on current Forest GIS site location data and assumes that all sites are recorded to standard and locational information is accurate.

An Initial Cultural Resources Report was prepared for the proposal and transmitted to the Colorado State Historic Preservation Office on March 24, 2021. The area of potential effects (APE) for the Southern HDs Landscape Restoration project is defined as the EA analysis area of approximately 35,000 acres. The Forest cultural resources GIS data

indicate that approximately 163 previous cultural resources inventories covering 15,375 acres have been conducted within the APE. This figure includes 12 class II (reconnaissance) level inventories covering approximately 8,993 acres and 151 class III (intensive) level inventories covering approximately 14,670 acres. Many of the inventories overlap one another.

The Forest cultural resources GIS data indicate that approximately 393 cultural resource sites and 334 isolated finds are located within the APE. This figure includes one archaeological district that is listed on the National Register of Historic Places (NRHP), 226 sites that have been determined eligible to the NRHP, 31 sites that are considered potentially eligible to the NRHP (needs data and unevaluated), and 135 sites that have been determined not eligible to the NRHP. Two proposed archaeological districts are also within the APE. The isolated finds have been determined not eligible to the NRHP.

If the Proposed Action is not implemented, no vegetation management or other ground-disturbing activities would take place in the APE as part of this project. Ongoing and future activities, such as routine road maintenance, recreation use, fire management, and noxious weed control would continue to occur under current Forest Plan standards. No new timber harvesting or fuels reduction treatments would result in greater vegetation growth, increasing the amount of ground cover and decreasing archaeological site exposure, soil and artifact erosion and surface runoff. This would have a generalized beneficial indirect effect on cultural resources. Conversely, greater vegetation growth and heavier fuel loads could also result in higher-intensity wildfires that require heavy-handed fire suppression tactics and cause large-scale vegetation loss, mortality, and ground exposure. This would potentially cause adverse effects on cultural resources.

The Proposed Action would protect NRHP eligible cultural resources by reducing the likelihood for high intensity wildfire in the project area. Removal of heavy fuel loads around cultural resource sites would reduce burn temperatures, fire intensity, and surface penetration of heat, thereby reducing the destructive capability of fire when in direct contact with cultural resources. Fuel reduction activities would also prevent high intensity fire from denuding surface vegetation, indirectly causing soil erosion and potential damage or destruction to subsurface cultural resources. With adherence to all cultural resource design elements, the proposed action will have no adverse effect on cultural resources. Although there may be other projects that spatially and/or temporally overlap the area of potential effects for the proposal, the lack of adverse direct or indirect effects means that there would be no adverse cumulative effects to historic properties.

Streamlined Process for Compliance with Section 106 of the National Historic Preservation Act (NHPA)

The procedure set forth in the *Programmatic Agreement among the United States Forest Service, Rocky Mountain Regional Office, Pike-San Isabel National Forest and Cimarron and Comanche National Grasslands, Routt National Forest, San Juan National Forest and the Colorado State Historic Preservation Officer Regarding Vegetation Management Undertakings* (USDA 2017) would be followed to satisfy compliance with Section 106 of NHPA. The Programmatic Agreement may be used for landscape-scale vegetation management undertakings implemented in phases and for which effects to historic

properties have not been fully determined prior to the National Environmental Policy Act (NEPA) decision. Under the Programmatic Agreement, cultural inventories will be conducted prior to the implementation of any ground disturbing projects and prior to prescribed burning in areas where fire sensitive resources, such as culturally modified trees, may exist. Appendix D of the Programmatic Agreement: Site Protection Measures, identifies a strategy and activity-specific design features intended to mitigate potential adverse impacts of the proposed activities on cultural resources.

The San Juan National Forest notified the Colorado State Historic Preservation Office of the proposal on March 24, 2021. When vegetation management treatment areas are identified within the project area, compliance with Section 106 is required. With limited exceptions, a class III (intensive) inventory would occur for all areas of proposed ground disturbance within the area of potential effects. The results would be reported in an Addendum Report which would be submitted to the Colorado State Historic Preservation Office for review and concurrence prior to implementation of each treatment area.

Under the Programmatic Agreement, the NEPA scoping process is used as the initial outreach to identify consulting parties and interested parties and to communicate with the public, as required in 36 CFR 800.3(e)-(f). Concurrently, a tribal consultation letter is sent to all culturally affiliated Indian tribes describing the proposal and requesting their participation in subsequently phased treatment areas. Tribes that request to continue consultation for the proposal are sent a project notification package. Following completion of the cultural inventory for each treatment area identified, these tribes are also sent a letter summarizing the results of the inventory and requesting feedback. If during consultation it is determined that implementation of a proposed unit has the potential to affect a property that is identified by a tribe as having traditional cultural or religious importance, the Forest would continue consultation with the tribe regarding the assessment and resolution of effects to the property. Tribal consultation is ongoing for the proposal.

Agencies or Persons Consulted

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this EA:

- A scoping letter regarding the proposal was mailed directly to interested parties on September 20, 2020. A scoping notice appeared in the *Durango Herald* (digital form) on September 10th, 2020. The proposal was listed on the *San Juan Public Lands Quarterly Schedule of Proposed Actions* beginning in September 2020, which was available on-line and through quarterly mailings.
- Scoping responses were received during the official scoping period from 40 sources, including adjacent landowners, an environmental group, a property owner's association, Colorado Parks and Wildlife, Tristate Generation and Transmission Association, Pagosa Trail Riders and La Plata Electric Association. Many of the commenters just wanted to be included in future mailings and kept informed; a couple commenters were concerned with potential impacts to private property from burning.

A Scoping Summary can be found in the project record. Full text of the comments can also be found in the project record.

- A 30-day public comment period on the pre-decisional draft EA generated responses from 19 external sources: eight from individuals, four from Tribes or Pueblos, one from another federal agency, one from the state wildlife agency, one from a county, and four from user groups and other non-governmental organizations. Responses to comments included some added design elements and an adjustment to the mechanical treatment units. A Response to Comments document and full comments letters can be found in the project record.
- Consultation with the Colorado State Historic Preservation Office was initiated on March 24, 2021. Consultation will be ongoing throughout the life of the project.
- A government-to-government consultation package with an invitation to consult was distributed to 25 consulting Native American tribes (the Hopi Tribe, Jicarilla Apache Nation, Kewa Pueblo, Navajo Nation, Ohkay Owingeh, Pueblo of Acoma, Pueblo de Cochiti, Pueblo of Isleta, Pueblo of Jemez, Pueblo of Laguna, Pueblo of Nambe, Pueblo of Picuris, Pueblo of Pojoaque, Pueblo of San Felipe, Pueblo of San Ildefonso, Pueblo of Sandia, Pueblo of Santa Ana, Pueblo of Santa Clara, Taos Pueblo, Pueblo of Tesuque, Pueblo of Zia, Southern Ute Indian Tribe, Ute Indian Tribe, Ute Mountain Ute Tribe, and Zuni Pueblo) on September 10, 2020. Two tribes requested to continue consultation for the proposal. The notification package containing the results of the class I literature review was sent to these tribes on March 30, 2021. Consultation on subsequent implementation actions under the NEPA decision would follow the process outlined in the Cultural Programmatic Agreement.

Forest Service Interdisciplinary Team members which contributed to this project, and their specialties include:

- | | |
|---|----------------------------------|
| • James Simino, District Ranger | • Eric Herchmer, Hydrology/Soils |
| • Noah Daniels, Fire/Fuels | • Jed Botsford, Recreation |
| • Skip Fischer/Jay Olson, Wildlife | • Sean Kelley, Range/Botany |
| • Cam Hooley, NEPA | • Jessey Ramirez, GIS |
| • Matt Tuten/Tim Leishman, Silviculture | • Walt Brown, Minerals |
| • Liz Francisco, Archeology | |

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Appendix A - Existing Design Elements and Best Management Practices

The following project features are standard practices or existing direction and are depicted by resource area.

Wildlife

1. Except for purposes of safety, no ponderosa pine snags 16" dbh or greater would be cut.
2. Prior to prescribed fire, protect Class I and Class II snags of ponderosa pine or Douglas-fir that are 16" dbh or greater.
3. Where possible, retain green trees with spiked tops, cavities, lightning scars, etc. Regardless of size, trees with apparent multiple cavities should be retained if possible during mechanical or burning operations.
4. Where possible, retain ponderosa pine snags in groups along ridge tops, upper portions of canyons, stream bottoms and on edges of forest openings.
5. If an active raptor nest is discovered during layout or implementation, the district biologist would be consulted for mitigation actions. No treatment would occur within 300 feet of potential southwestern willow flycatcher habitat.
6. Timber crews preparing areas for mechanical treatments in goshawk habitat will be trained to identify goshawks and their nests. If an active goshawk nest is discovered, the district ranger will determine appropriate mitigation measures to avoid disruption of nesting and fledging process consistent with Forest Plan requirements.

Watershed

7. Stream course, wetland, spring, and water influence zone buffers will be clearly marked within the treatment units prior to operations.
8. Mechanized equipment is prohibited in buffer zones around streams and wetlands during treatment operations unless the ground is protected by 12 inches of packed snow or 2 inches of frozen soil. Buffer zones are defined as follows unless otherwise determined by a hydrologist: Ephemeral streams – 50 feet on each side; Intermittent streams and springs – 75 feet on each side; Perennial streams 100 feet on each side; and Wetlands 100 feet around the perimeter of the feature. No-equipment buffer zones do not apply to designated stream crossings.
9. Operations shall be conducted to prevent debris from entering perennial or intermittent stream courses. In the event that debris enters stream courses in amounts that may adversely affect the natural flow of the stream or water quality, such debris will be removed as soon as practicable, but not to exceed 2 days during periods of actual or expected flow and in an agreed manner that will cause the least disturbance to the stream course.
10. Do not masticate or cut vegetation that is growing within, on the banks of, or within 25 feet of defined stream channels, gullies, ditches, wetlands, or ponds.

11. Equipment shall not be operated in stream channels except to ford at crossings designated by the Forest Service. Cross perpendicular to the direction of flow and do not cross where banks exceed 30% slope.
12. Do not encroach road fill or introduce soil into streams, swales, or riparian areas during implementation of any proposed projects.
13. Proper drainage will be constructed or reconstructed on existing and temporary roads that would be used during vegetation treatment operations. Road-stream crossings and dips through habitually wet areas on Forest Service roads open to motorized public use would be hardened. All drainage structures on roads would be inspected at the completion of the project to make sure they are in good condition and functioning properly. Blading roads that are currently well vegetated with grass would be minimized as much as possible.
14. Keep log landings and skid trails out of Stream Management Zones, swales, and parks. Locate and construct log landings in such a way to minimize the amount of excavation needed and to reduce the potential for soil erosion. Design landings to have proper drainage.
15. Skid trails will be located perpendicular to slope angles (along the contour) as much as possible. Avoid creating a dendritic runoff pattern. Do not skid up and down drainage bottoms. As needed, install waterbars or outslope and spread slash on skid trails upon completion of use. Skid trails shall be rehabilitated upon completion of use by returning them to the original grade, water barring, spreading slash and/or seeding as necessary.
16. Landings shall not be placed within 100 ft. of perennial, ephemeral, or intermittent streams. Landings shall be rehabilitated upon completion of use by ditching and/or sloping to permit water to drain and spread. Cut and fill banks around landings shall be sloped to remove overhangs and otherwise minimize erosion. Landings will be ripped or scarified and seeded.

Soils

17. When soils are saturated, equipment operations will cease until the ground dries out or freezes. Soils are considered saturated when ruts created by equipment are four inches deep beyond the lug tread of the tire for ten feet or longer. Limit equipment operations to sustained slopes less than 40%. Limit soil disturbance to less than 15% of the treated area.
18. Operate heavy equipment only when soil moisture is below the plastic limit or protected by at least 12 inches of packed snow or 2 inches of frozen soil. Soil moisture exceeds the plastic limit if the soil can be rolled into 3 mm threads without breaking or crumbling (FSH2509.25 Chapter 10 management measure 14.1 Design Element 1b).
19. At least 10% of treatment generated slash should be left on site and distributed throughout the treatment units to help prevent soil movement and provide for nutrient cycling.

Vegetation

20. Pre-settlement trees will be protected except those that have been identified as a safety risk or as necessary to make the shaded fuel break, or to treat localized areas of beetle affected trees. Pre-settlement trees are those established prior to 1880 and can be identified by the relatively smooth orange bark with large plates and irregular flat-topped crowns.
21. Where possible, avoid treatment of Gambel oak greater than 6" diameter at root collar. Gambel oak retained should be left in a mosaic pattern consisting of clumps ranging in size from a tenth of an acre to 10 acres.
22. Slash generated by the project should be piled in most areas for later burning. In some areas with a low density of slash, it may be scattered over the ground surface and not exceed 6 inches in depth.
23. Stumps from cut trees should not exceed 12 inches height above the ground as measured from the uphill side.
24. Do not masticate or cut riparian or wetland species such as willows or cottonwoods.
25. Pre-treatment of noxious weeds in areas that may experience ground disturbance (i.e. landings, mastication units, etc.) will be administered before project implementation. All equipment brought into the project area will be cleaned and inspected prior to operating. Post treatment of noxious weeds will be administered upon project completion. Infestations of noxious weeds will be inventoried, monitored and treated as necessary within the project area for a minimum of five years after the project is complete.
26. If Knowlton's cactus (*Pediocactus knowltonii*) is found within the project area before or during implementation, project activities will cease until the Forest Service is notified and mitigation measures are applied.

Cultural Resources

27. The procedure set forth in the *Programmatic Agreement among the United States Forest Service, Rocky Mountain Regional Office, Pike-San Isabel National Forest and Cimarron and Comanche National Grasslands, Routt National Forest, San Juan National Forest and the Colorado State Historic Preservation Officer Regarding Vegetation Management Undertakings* (USDA 2017) would be followed to satisfy compliance with Section 106 of NHPA. The Programmatic Agreement may be used for landscape-scale vegetation management undertakings implemented in phases and for which effects to historic properties have not been fully determined prior to the NEPA decision. Appendix D of the Agreement: Site Protection Measures, identifies a strategy and activity-specific design features intended to mitigate potential adverse impacts of the proposed activities on cultural resources.
28. If a previously undocumented historic property is discovered, or if inadvertent effects occur to a historic property, all work in the vicinity of the property shall cease and a San Juan National Forest archaeologist shall be notified immediately. The property shall be protected and project activities in the immediate vicinity of

- the property shall not resume until any actions necessary to resolve adverse effects to the property have been completed.
29. Upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony, a San Juan National Forest archaeologist shall be immediately notified by telephone, with written confirmation. All project activities shall cease in the vicinity of the discovery, and the discovery shall be protected for 30 days, or until the contractor is given notice to proceed by a San Juan National Forest archaeologist.

Project Access/Visual Quality

30. Leave visual screening dispersed along roads and trails where there are sight line or travel management concerns.
31. Leave visual screening between existing and proposed gas well pads and nearby houses and roads.
32. Coordinate access route alignments to utilize the same alignments as proposed gas well roads if possible.
33. Temporary roads would be short-term in nature, would only be bladed where necessary, and would be rehabilitated after each treatment unit is finished.

Miscellaneous

34. Notify gas industry operators, adjacent landowners, utility companies, and other SJNF permittees at least 30 days in advance of prescribed burning. Public notification will also be made immediately beforehand.
35. Section corners and survey monuments will be protected.
36. No temporary road construction will occur in Colorado Roadless Areas; temporary overland motorized use is allowed but minimized to the extent possible.